MAHONINGSIDE POWER PLANT
WATER TREATMENT SYSTEM
DESCRIPTION AND AS-BUILT DRAWINGS

Prepared by:

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Project No. 3141-65

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1. INTRODUCTION

Environmental Quality Management, Inc. (EQ) was given the task of upgrading and winterizing an existing water treatment system that was used by a previous contractor to treat polychlorinated biphenyls (PCBs) at the Mahoningside River Power Plant site. EQ utilized existing submersible sump pumps, hoses, carbon vessels, roll-off boxes, and bag filter housings in an effort to minimize purchased equipment. However, the equipment on site was not performing as designed. The carbon vessels were plugging from iron oxidation and PCB breakthrough was occurring in effluent samples. This document will describe the modifications made to the existing system and the work practices that are contributing to effluent that is clean in appearance and has had no PCB "hits" since coming on-line.

Section 2 provides a general description of the winterization and the water treatment system as it was constructed. This section also contains the as-built drawings.

Section 3 describes the significant procedures followed by personnel on a regular basis during system operation.

Appendix A contains the specification sheets, and catalog descriptions of the equipment used in the water treatment plant.

of residence time for oxidation to take place. Water is pumped to the settling tank (T300B) using a submersible pump (P300A) that is controlled with an attached float switch (FS300A) so that the pump does not operate continuously in low flow conditions. The oxidized iron is allowed to settle in T300B and the water is then pumped, again via submersible pump with attached float switch (P300B & FS300B), to the holding tank (T300C).

There are two floats on the float switch (FS300C) in the holding tank. When the water level rises, the higher float sends a signal to the control panel (CP400) that starts the centrifugal pumps (P401 and P402). When the water level falls to that of the lower float, the float sends a signal to the control panel to turn off the centrifugal pumps. The pumps are used to lift the water from the holding tank and push it through the remainder of the treatment system. These pumps were installed inside a wooden enclosure with an electric space heater to prevent the pumps from freezing during operation in the winter. The water is transferred via insulated and heat-traced PVC schedule 80 piping to the building that was built to protect the filtration and carbon vessels. The water is transported to the filtration systems inside the building. There are two systems operating in parallel (F501A & F501B and F502A & F502B). Water flows through both systems whenever the centrifugal pumps are in operation.

The filters and carbon vessels are located in a building that was erected to protect these items from freezing during operation in the winter. The walls and roof of the building are insulated with foil backed rigid insulation. A single propane heater provides the heat.

Each filtration system is made up of a 25 micron bag filter and a 5 micron bag filter in separate housings. The bags are standard number 2 size polypropylene felt. Each of the filter housings that hold the bags is fitted with a pressure gauge that monitors pressure build up. Pressure increase is an indication that the bag is dirty and needs changing.

The water continues from the filtration systems to the lead carbon vessel in each system (C601A and C602A) where it comes in contact with 2,500 pounds of activated carbon. Water exits the bottom of the lead vessel and enters the top of the lag vessel. All carbon vessels are configured as top influent, bottom effluent vessels. Lag vessel C601B is filled with 1,500 pounds of activated carbon whereas C602B holds 2,000 pounds. After the water exits each lag carbon vessel the water exits the building and discharges into the final holding tank (T800) before being discharged to the sewer.

Two submersible pumps (P801 and P802) pump the final effluent to the sewer. These pumps are operated manually and continuously when there is water in the final holding tank.

Electrical Description

Electricity was obtained for the equipment from two separate sources. The submersible pumps, heat tracing, and lighting are all 120-volt, single phase pieces of equipment. The control panel and the centrifugal pumps use 240 volt three phase power.

The power for the lighting, submersible pumps, and heat trace existed prior to modifying the water treatment system. Its location (street level) however, was not near enough the equipment (basement level). The 120-volt power was extended into the new building and a new breaker box was installed on the building wall as shown in Drawing P-02. This panel supplies power to the lighting inside the building and provides power to eight sets of electrical outlets that are used by the submersible pumps and heat tracing outside the building. There are three, 300 foot extension cords and five, 250 foot extension cords wired directly into the panel inside the building. Each of the cords has multiple outlets at the other end that feeds power to the pumps and heat trace lines.

Secondary power for the centrifugal pumps and their control panel is provided from a different primary power source than the aforementioned power. The primary power is transformed to 240 volt, 3 phase power and run to a separate meter. The power is run via conduit from the meter to a main shutoff located on the basement level directly next to the control panel that operates the centrifugal pumps (Drawing P-02).

FS FLOAT SWITCH
FI FLOW INDICATOR
PI PRESSURE INDICATOR
SAMPLE TAP
BALL VALVE
CENTRIFUGAL PUMP
CHECK VALVE
M P300B SUBMERSABLE PUMP
CAP

OXIDATION AND SETTLING SYSTEM

FROM ALL SUMPS
CL201
CL202
FS300A
FS300B
FS300C
CP400
P401
P402
ELECTRIC HEATER
HEAT TRACED
ENCLOSURE
PROPANE HEATER
ENCLOSURE
P101
P102
P300A
P300B
P803
P803 TEMPORARY PUMP FOR BACKWASH
P801
P802
T100
T300A
T300B
T300C
T800
TO SEWER

PI501A
PI501B
PI601A-I
PI601B-I
SP501A
SP501B
SP601A-0
SP601B-0
F501A
F501B
C601A
C601B
FI701
BACKWASH EFFLUENT TO ADJACENT SUMP
BACKWASH WATER FROM T-800

PI502A
PI502B
PI602A-I
PI602B-I
SP602A-0
SP602B-0
F502A
F502B
C602A
C602B
FI702

REV	DESCRIPTION	DATE	APPROVED
1	ADDED I.D. NOMENCLATURE		
	REDRAWN ON CAD	11/6/00	

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DRAWN	D.TOMO	10/31/00
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APPROVED		

SCALE: NONE

1 OF 2

MAHONINGSIDE POWER PLANT
WATER TREATMENT
P&ID

ORIGINAL SIZE	PROJECT NO.	DWG NO.	REV
B	030141.0065	P-01	0

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Equipment Number	Description
T100	Main collection sump
P101	1/2 Hp Gorman Rupp Model S2C3A, 115V, 1 Ph, Impeller dia 3.69", 3470 rpm
P102	1/2 Hp Gorman Rupp Model S2C3A, 115V, 1 Ph, Impeller dia 3.69", 3470 rpm
CL201	Jet chlor model 120 chlorine tablet feeder
CL202	Jet chlor model 120 chlorine tablet feeder
T300A	25 yard lined rolloff box (approximately 5,000 gallons)
P300A	1/2 HP submersible pump with attached snap float switch (FS300A)
FS300A	Float switch attached to P300A.
T300B	25 yard lined rolloff box (approximately 5,000 gallons)
P300B	1/2 HP submersible pump with attached snap float switch (FS300B)
FS300B	Float switch attached to P300B.
T300C	Equalization basin fabricated from an existing sump.
FS300C	Float level switch controlling P401 and P402 in the automatic mode
CP400	Control panel with integral motor starters for automatic on/off of P401 and P402.
P401	Electric centrifugal repressurization pump Price pump model XT100BF-598-21111-500-36-3T6 serial #00111310025-01
P402	Electric centrifugal repressurization pump Price pump model XT100BF-598-21111-500-36-3T6 serial #00111310026-01
F501A	Rosedale Model 8-30-2P-1-150-C-B-S-B bag filter housing with 2" inlet and outlet connections;25 micron bags.
PI501A	0 - 100 psig pressure gage
SP501A	Sampling port
F501B	Rosedale Model 8-30-2P-1-150-C-B-S-B bag filter housing with 2" inlet and outlet connections;5 micron bags.
PI501B	0 - 100 psig pressure gage
SP501B	Sampling port
F502A	Rosedale Model 8-30-2P-1-150-C-B-S-B bag filter housing with 2" inlet and outlet connections;25 micron bags.
PI502A	0 - 100 psig pressure gage
F502B	Rosedale Model 8-30-2P-1-150-C-B-S-B bag filter housing with 2" inlet and outlet connections;5 micron bags.
PI502B	0 - 100 psig pressure gage
C601A	HDPE lined, FRP adsorber with PVC internals, bottom support skirts and 2" FNPT inlet and outlet connections with 2,500# activated carbon capacity. 63" diameter, 104" height and 150 psig pressure rating.
SP601A-□	Sampling port
PI601A-I	0 - 100 psig pressure gage
C601B	HDPE lined, FRP adsorber with PVC internals, bottom support skirts and 2" FNPT inlet and outlet connections with 1,500# activated carbon capacity. 48" diameter, 90" height and 150 psig pressure rating.
SP601B-□	Sampling port
PI601B-I	0 - 100 psig pressure gage
C602A	HDPE lined, FRP adsorber with PVC internals, bottom support skirts and 2" FNPT inlet and outlet connections with 2,500# activated carbon capacity. 63" diameter, 104" height and 150 psig pressure rating.
SP602A-□	Sampling port
PI602A-I	0 - 100 psig pressure gage
C602B	HDPE lined, FRP adsorber with PVC internals, bottom support skirts and 2" FNPT inlet and outlet connections with 2,000# activated carbon capacity. 63" diameter, 87" height and 150 psig pressure rating.
SP602B-□	Sampling port
PI602B-I	0 - 100 psig pressure gage
FI701	Blue - White pitot style flow rate indicator 20 - 100 gpm
FI702	Blue - White pitot style flow rate indicator 20 - 100 gpm
T800	25 yard lined rolloff box (approximately 5,000 gallons)
P801	1/2 Hp Gorman Rupp Model S2D3A, 115V, 1 Ph, Impeller dia 3.69", 3470 rpm
P802	1/2 Hp Gorman Rupp Model S2D3A, 115V, 1 Ph, Impeller dia 3.69", 3470 rpm
P803	1/2 HP Submersible pump

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REV	DESCRIPTION	DATE	APPROVED

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SCALE:	NONE	
	2 OF 2	

MAHONINGSIDE POWER PLANT
WATER TREATMENT
P&ID

ORIGINAL SIZE	PROJECT NO.	DWG NO.	REV
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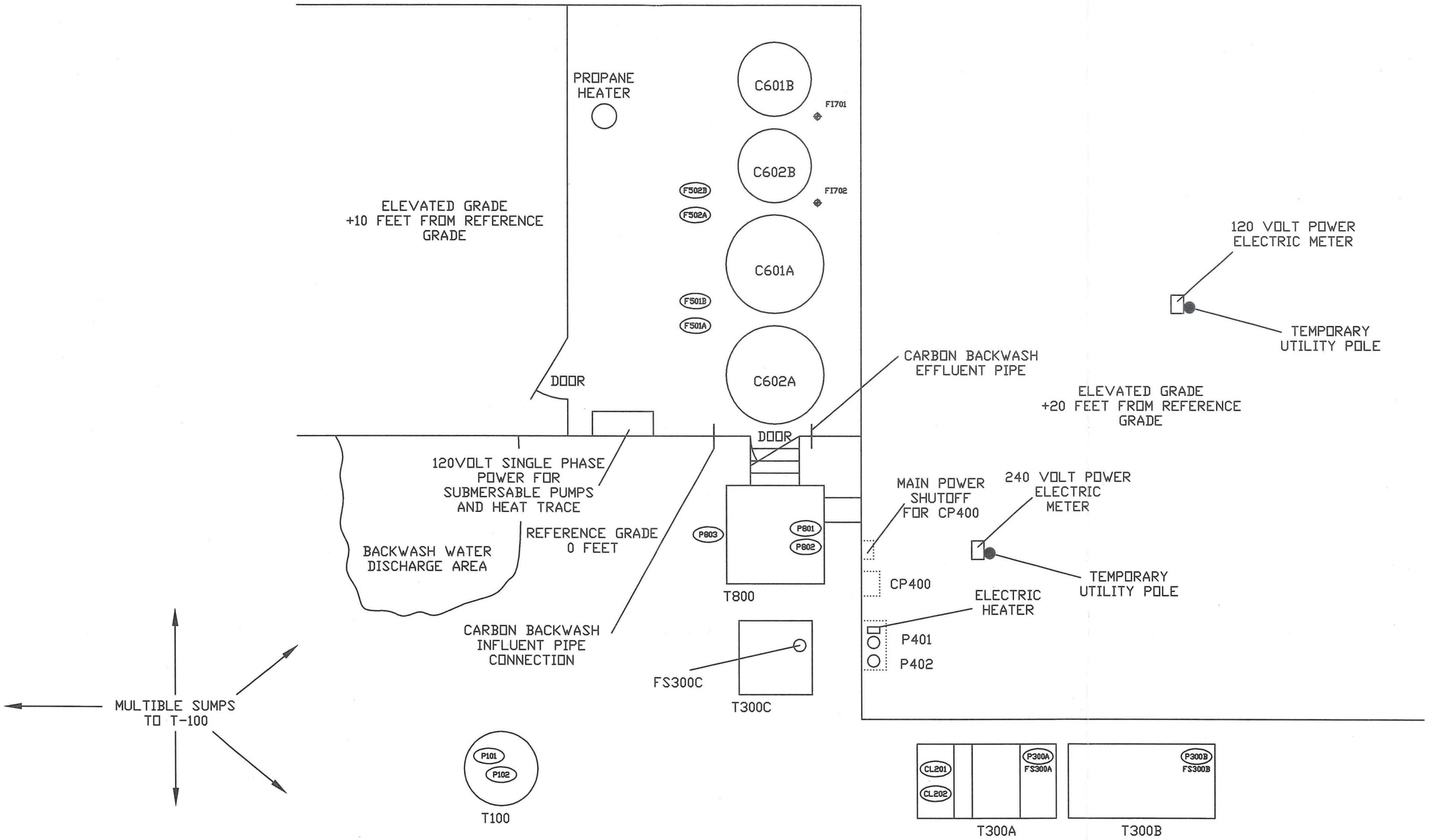

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REV	DESCRIPTION	DATE	APPROVED

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APPROVED		

SCALE: NONE

1 OF 1

MAHONINGSIDE POWER PLANT
WATER TREATMENT
SITE PLAN

ORIGINAL SIZE	PROJECT NO.	DWG NO.	REV
B	030141.0065	P-02	0

3. SYSTEM OPERATIONS

The system requires only three significant tasks be done regularly to assure constant trouble free operation. The chlorine contactors must be refilled as the tablets dissolve. The bag filters must be changed when they become dirty. The carbon vessels must be backwashed weekly.

Refilling the chlorine tablets is done by taking the top off of the chlorine contactor and dropping the tablets into the tubes until filled to the top. There are 4 tubes inside the contactor. Instructions are found in the manufacturer's literature in the Appendix. The operator knows when to fill the contactor visually by monitoring their level on a regular basis.

Bags are changed on an as-needed basis. The pressure differential between the first and second filter housings is the parameter used to indicate that the bags must be changed. It is the operator's discretion as to the differential pressure allowed before bag changeouts. Currently the bags are changed daily. The system must be shut down to change the bags. Therefore, it is most efficient to change all four bags at once to minimize downtime.

The carbon vessel system is plumbed to allow periodic backwashing. Currently the system is backwashed weekly. To backwash the carbon vessels the operator must shut down the system. After the centrifugal pumps are shut down, the valve configuration must be switched to allow backwash water to enter the bottom of each vessel and exit through the backwash effluent line at the top. To do this the operator must open all valves from the backwash influent pipe and close the valve for the process discharge pipe. On top of each vessel the valve to the backwash effluent pipe must be opened and the valve to the process influent pipe must be closed. The water used to perform the backwash is taken from the clean water in T800. A submersible pump is attached to a hose that is in turn attached to the backwash influent pipe. The pipe protrudes from the

building and its location is shown on Drawing P-02. The backwash effluent will be discharged into the large area shown on Drawing P-02. A hose needs to be connected to the backwash effluent pipe that protrudes from the building. Location of the pipe is shown on Drawing P-02. When all connections are made, begin pumping the clean backwash water from T800 into the carbon vessels. Continue to do this until the backwash water being discharged becomes clean relative to when the backwash began. Upon completion of the backwash, turn off the submersible pump, switch all valves for the carbon vessel piping to the operating positions and disconnect all hoses attached to piping outside the building.

The cleaning of the settled iron oxide from the settling tank (T300B) is the final operational item. If the iron oxide is allowed to build up too much, the settling time in the tank will decrease to a point where nothing will settle out. The operator should check the level of the settled solids periodically.

APPENDIX A
EQUIPMENT SHEETS

JET-CHLOR TABLET CHLORINATOR MODELS 110 - 120

INSTALLATION AND OPERATION

GENERAL

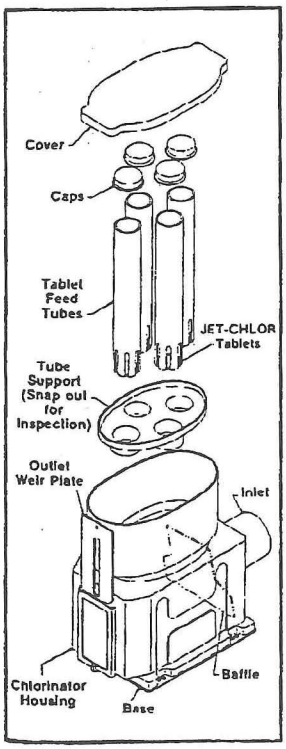
DESCRIPTION

Model 110 and 120 JET-CHLOR Tablet Chlorinators are complete chlorine dispensing systems. The Model 110 has a 6⅝" diameter inlet and the Model 120 is equipped with a blank inlet to allow field adaption to plant discharge lines up to 10" in diameter. They are designed to handle the flow of treated effluent from wastewater treatment plants with design flows of up to 50,000 gallons per day. For larger systems, two chlorinators used in parallel can treat up to 100,000 gallons per day.

The JET Tablet Chlorinator has no moving or electrical parts. It uses JET-CHLOR Disinfecting Tablets — not powders or gases. The JET Chlorinator works by gravity flow alone — chlorine dosage automatically adjusts with increases and decreases in effluent flow.

HOW THE CHLORINATOR WORKS

The JET-CHLOR Tablet Chlorinator consists of a housing, inlet baffle, outlet weir (three sizes to choose from) and four tablet feed tubes. The chlorinator is installed on the plant's discharge line or on the chlorine contact chamber inlet so that plant discharge flows through it. An inlet baffle and feed tubes control the direction of flow within the chlorinator.



Slow-dissolving JET-CHLOR Tablets at the bottom of the feed tubes are immersed in the effluent. They dissolve evenly, slowly releasing active chlorine. The rate at which the tablets dissolve is regulated automatically by controlling the liquid height with weirs and by varying the amount of tablets in contact with the effluent.

The outlet weir controls the liquid level inside the chlorinator housing. When the flow of effluent increases, the liquid level in the housing rises, covering more tablets and releasing more chlorine. When the flow decreases, the liquid goes down. As a result, fewer chlorine tablets are immersed and less chlorine is released. In this way, the rate at which the chlorine tablets dissolve is continuously adjusted to the effluent flow.

INSTALLATION

INLET CONNECTION — MODEL 110

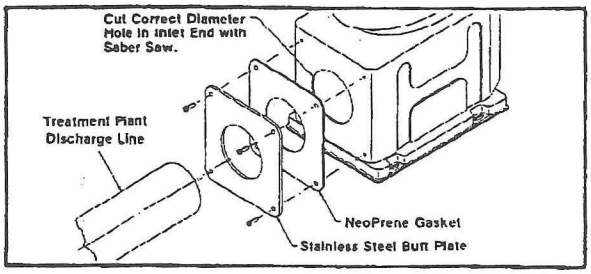
Model 110 is equipped with a 6⅝" diameter inlet for connection to treatment plants, sand filters, etc., with 6⅝" discharge lines. To make the connection, butt fit the discharge line to the chlorinator inlet using a flexible coupling (not supplied) as illustrated in the mounting instructions below. The flexible coupling consists of a neoprene sleeve, a stainless steel shield, and hose clamps. These can be obtained from your local plumbing supply house.

On installations where the discharge line is larger or smaller than the chlorinator inlet, use expansion or reducer couplings or the Model 120 chlorinator.

INLET CONNECTION — MODEL 120

Model 120 is equipped with a blank inlet side. Discharge lines up to 10" O.D. can be connected as follows:

1. Mark hole size to be cut at center of blank chlorinator inlet wall using end of discharge line as template.
2. Using either saber or keyhole saw, cut hole as marked.
3. Insert discharge line 1" into chlorinator and seal to chlorinator using either good waterproof grout, caulking compound or neoprene gasket with stainless steel butt plate as illustrated. If a gasket and butt plate are used, the gasket must fit tightly to the pipe and be at least 1/4" thick. Use the pipe end as a template to draw the gasket outline. These items are not supplied but can be obtained from your local plumbing supply house.



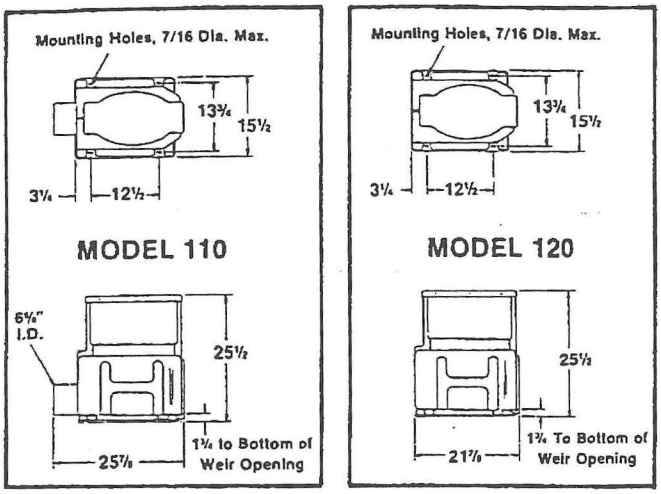
MOUNTING

The chlorinator housing can be installed either on the system's chlorine contact chamber or in-line using a drop-box (not supplied). If the chlorinator is installed on the contact chamber, it should be at the inlet or as close as possible to it. If it is installed in-line and a contact chamber is used, it should be installed before the contact chamber. If a contact chamber is not used, then the chlorinator must be installed with a drop-box. The following rules apply to both methods:

1. Chlorinator top must be accessible for easy removal of feed tubes from housing.
2. Secure housing with rigid mounting, bolting or ramsetting, to prevent it from moving.
3. Be sure housing is level and plumb to insure proper operation.
4. Allow clearance at outlet end of chlorinator to prevent any interference with discharge and to allow reading of flow rate on calibrated weir.

The chlorinator can usually be mounted on the chlorine contact chamber. The housing can be mounted either above the tank or to its inside wall depending on the location of the inlet line.

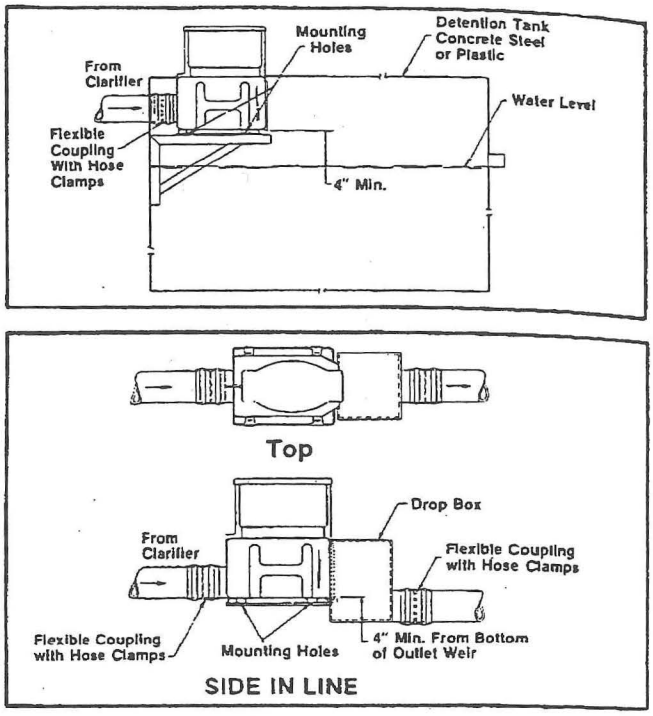
This method requires that the chlorinator be bolted to a bracket



(optional) rigidly mounted, bolted or ramset to the contact chamber. The bracket can be purchased from Jet or made from angle iron properly coated to retard rust. Leave a minimum of 4" between the bottom of the chlorinator and the tank liquid level when mounted.

The chlorinator can also be installed in-line, but a drop-box must be provided to allow unrestricted flow from the chlorinator outlet weir.

In-line mounting requires the drop-box be designed to connect to the outlet pipe and to allow a minimum of 4" between the bottom of the outlet weir and the bottom of the outlet pipe from the drop-box. It is important that the drop-box and chlorinator



are supported so that there is no movement or strain on the couplings. The drop-box can be constructed of rustproofed metal, plastic or a concrete casting. Drop-box drawings are available upon request.

OPERATION

OPERATING VARIABLES

Chlorine dosage depends upon the amount of treated effluent in contact with the JET-CHLOR Disinfecting Tablets in the chlorinator. Fluid contact with the tablets is controlled by two factors:

- The size of the outlet weir installed.
- The number of feed tubes filled with tablets.

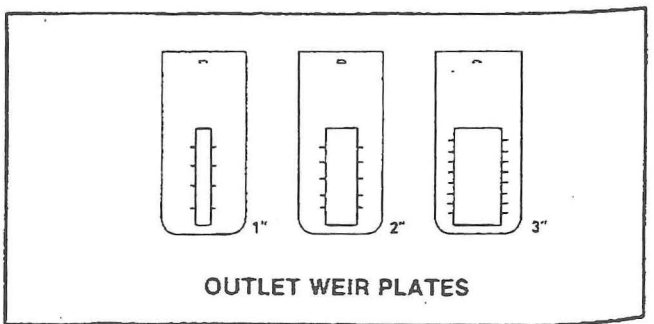
SELECTING WEIR SIZE AND NUMBER OF STOCKED FEED TUBES

1. Determine Chlorine Residual Requirements.
   The requirements for chlorine residuals vary in different areas. Contact your local health department to determine the requirements for your installation. In the absence of local regulations, 1 ppm is usually considered adequate.
2. Estimate Plant Flow Rate.
   On new or existing installations, consult the architect, engineer, or health department for the estimated flow rate. The flow rate may also be determined by the following methods: 1) use a flow meter; 2) check previous flow rate or water meter records; 3) find lift station capacity (if the plant is so equipped) and the number of pumping cycles per day.
3. Select Weir Size and Number of Feed Tubes.
   After determining the chlorine residual requirements and the plant flow rate, use the "Outlet Weir Selection Chart" to choose the correct weir size and number of feed tubes to stock. Use the chart as follows:
   A. Pick chlorine residual required in Column 1.
   B. Match it to flow rate in Column 2.
   C. Read across chart to Columns 3 and 4 for weir size and number of filled feed tubes required. The weir sizes and number of feed tubes in the shaded areas of the chart provide maximum control of residuals but also require more frequent feed tube filling.

   The use of the proper size weir and correct number of filled feed tubes is essential to the system's efficiency. Lower residual chlorine indicates insufficient chlorination. Higher residual than required wastes tablets, requires more frequent feed tube fillings and overchlorinates the effluent.

INSTALLING THE OUTLET WEIR

1. The weir plate is calibrated in gallons-per-minute on one side and liters-per-minute on the other. The easy to read calibrations provide instantaneous flow readings which are helpful in estimating daily plant flow.
2. Insert weir plate into slot at outlet end of chlorinator housing. Be sure calibrations which you want to use (English or metric) face toward outside of chlorinator.
3. Slide plate down until it is firmly pressed into slot bottom.
4. Caulk joint between plant and chlorinator housing to prevent leakage. All the water must pass through the weir for effective operation.



OUTLET WEIR SELECTION CHART

1	2	3		4		5	6
Chlorine Residual Required[1]	Flow Rate GPD × 1000	Weir Size Required[2]		Number of Feed Tubes Required[2]		Estimated Operating Weeks Before Refill	Pounds of JET-CHLOR Tablets Required Per Week
.5 ppm	Up to 10	3"		1		8½	1.0 lbs.
	10-20	3"		1		8½	1.0 lbs.
	20-30	3"		1		6	1.4 lbs.
	30-40	3"		1		4	2.0 lbs.
	40-50	3"		1		3½	2.5 lbs.
1.0 ppm	10	2"		1		8½	1.0 lbs.
	20	2"		1		8½	1.0 lbs.
	30	2"		1		3	2.8 lbs.
	40	2"		1		2	4.2 lbs.
	50	2"		1		2	4.0 lbs.
1.5 ppm	10	3"	1"	2	1	8½ (6)	2.0 lbs.
	20	3"	1"	2	1	6 (3)	2.8 lbs.
	30	3"	1"	2	1	3½ (2)	4.8 lbs.
	40	3"	1"	2	1	3 (1.5)	5.6 lbs.
	50	3"	1"	2	1	2 (1)	8.5 lbs.
2.0 ppm	10	2"	—	2	—	8½	2.0 lbs.
	20	3"	2"	3	2	6½ (4)	3.9 lbs.
	30	3"	2"	3	2	4 (3)	6.3 lbs.
	40	3"	2"	3	2	3 (2)	8.5 lbs.
	50	3"	2"	3	2	2½ (1.5)	10.2 lbs.

[1] **Based on use of JET-CHLOR Disinfecting Tablets with at least 70% available chlorine and 30 minute detention time.**

[2] **Selections in shaded areas must be used together. They cannot be mixed with unshaded selections.**

JET-CHLOR TABLETS

JET-CHLOR Tablets were developed especially for use in JET-CHLOR Chlorinators and we recommend their use. JET-CHLOR Tablets dissolve slowly, evenly and completely — they will not "wick" or dissolve prematurely. They provide fast, complete bacteria killing power and inhibit bacteria regrowth at the same time. Their convenience, efficiency and dependability is unsurpassed.

Your JET-CHLOR Dealer can provide you with tablets for refilling the chlorinator yourself, and, in many areas, he can offer you a complete refilling service. Write Jet Inc. for the name of your local dealer.

FILLING FEED TUBES

We recommend you only use JET-CHLOR Tablets in this chlorinator. Before handling JET-CHLOR Tablets read the container label and the "Danger" section below.

To fill the chlorinator, remove the top and tubes from the housing. Fill only the number of tubes determined from the "Outlet Weir Selection Chart" Column 4. Fill the tubes as follows:

1. Remove caps and rinse tubes clean with water.
2. Fill each tube to top, one tablet at a time. Each tube holds approximately 27 JET-CHLOR Tablets.
3. Tablets must lie flat, or tubes will clog and prevent proper feeding of chlorine.
4. Replace caps on filled tubes.
5. See JET-CHLOR container label for additional instructions.

DANGER — KEEP OUT OF REACH OF CHILDREN

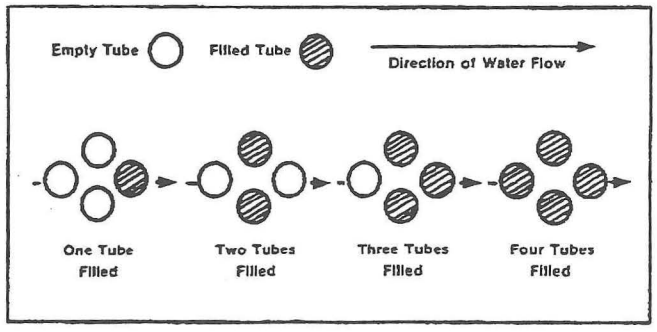
The product is highly corrosive, causes skin and eye damage and may be fatal if swallowed. Do not get into eyes, or skin or on clothing. Wear goggles or face shield and rubber gloves when handling tablets or working with the chlorinator. Irritating to nose and throat. Avoid breathing dust. Remove and wash contaminated clothing before reuse. It is a strong oxidizing agent and should be mixed only with water. Contamination may cause fire! If swallowed, feed bread soaked in milk followed by olive oil or cooking oil. Call a physician immediately. If on skin: [illegible] chemical and flush skin with cold water for at

violation of federal law to use JET-CHLOR Tablets in a manner inconsistent with the label on the JET-CHLOR container.

INSTALLING FEED TUBES

The location of filled and unfilled tubes in the chlorinator is very important. The proper location is shown below. Any arrangement different from those illustrated will cause improper chlorination, tablet erosion and waste. Install the feed tubes as follows:

1. Install filled and capped feed tubes in housing with slotted end down.
2. Remove cap from empty tubes and insert tubes into housing with slotted end up. This directs water flow to filled feed tubes.
3. Put caps back on slotted end of unfilled tubes after tubes are installed. Check to be certain tubes have been replaced correctly. If any tubes are not evenly seated on bottom of housing, the cover of the chlorinator will not fit properly.
4. Snap on tablet chlorinator cover.



STARTING UP THE CHLORINATOR

After the correct size weir is installed and the filled and unfilled feed tubes are properly positioned, allow the entire plant discharge to flow through the chlorinator.

After the JET-CHLOR System has been in operation for at least one hour, take effluent samples from the discharge end of the chlorine contact chamber. Take samples at 15 minute intervals and measure each for chlorine residual. When two or three con-

has reached a state of equilibrium. The system is now stabilized and operation is continuous and automatic.

Additional samples may be taken periodically to check the chlorine residual. Chlorine residual test kits are available from Jet Inc. or your dealer.

ADJUSTING CHLORINE RESIDUAL

If the tests during start-up or at a later date indicate too little or too much chlorine residual, change the degree of chlorination as follows:

1. Decrease chlorination by using a larger weir size, fewer filled tubes or both.
2. Increase chlorination by using a smaller weir size, additional filled feed tubes or both.
3. If any difficulty is encountered, go through "Trouble-Shooting" section and try these adjustments again.

MAINTENANCE

Before restocking the chlorinator with JET-CHLOR Tablets, check the tubes and housing to see if cleaning is needed. Residue and solids which accumulate on or in the tubes must be removed by rubbing or gently scraping with a stiff brush or gloved hand. CAUTION: Wear goggles or face shield and rubber gloves when handling JET-CHLOR Tablets or working with the chlorinator.

Clean out any dirt accumulation in the housing. It should be minimal because of the smooth inside surface. Dirt can usually be flushed out easily with a hose or by simply removing the weir plate. This causes a surge of liquid through the chlorinator which carries out any accumulated solids. Recaulk the weir plate if removed.

The feed tube support can be snapped out for access to the bottom of the housing if necessary. After it is reinstalled, be certain the filled and unfilled tubes are replaced in the proper position.

REFILLING THE FEED TUBES

CAUTION: Read the "Filling Feed Tubes" section and the "Danger" notice that follows it before refilling the feed tubes. Always wear goggles or face shield and rubber gloves when handling JET-CHLOR Tablets or working with the chlorinator.

Restocking of the feed tubes should be done on a schedule based on the "Estimated Operating Weeks Before Refill." This information is given in Column 5 of the "Outlet Weir Selection Chart." To refill, take off the chlorinator top and remove only those tubes which were previously filled. Leave the empty tubes, with the slotted ends up, in the chlorinator housing. Fill the tubes and reinstall according to the instructions in "Installing Feed Tubes."

TROUBLE SHOOTING

Insufficient Chlorination

Many factors can cause an insufficient amount of chlorine residual. Before decreasing weir size or increasing the number of filled feed tubes, check the system and correct any of the following conditions:

PROBLEM	CORRECTION
Feed tubes not resting on bottom of housing.	Adjust tubes so they rest evenly on bottom of chlorinator housing.
Tablets jammed in feed tubes.	Reload tubes properly so all tablets drop down.
Heavy rain or snow has caused short-term hydraulic overload.	Chlorinator has been designed to handle short-term gross hydraulic overload and no adjustment should be made. Allow system to operate another two hours and recheck chlorine residual.
Additional homes, businesses or other new wastewater sources connected to system have caused an increase in the average daily flow.	If less than 2 ppm chlorine residual is required, no adjustment is necessary. If 2 ppm chlorine residual is required and average daily flow rate exceeds 10,000 gallons per day, see "Outlet Weir Selection Chart" for weir size and number of filled tubes for new flow rate.

Overchlorination

When the amount of chlorine residual is excessive, it is because too much chlorine is being added to the wastewater. Before increasing weir size or decreasing the number of filled feed tubes, check chlorinator for blockage. Any clogging of the weir will cause a rise in the liquid level and immerse too many tablets. If blockage is found, remove immediately.

Check Chlorine Residual

If the weir size or number of filled feed tubes is changed, test the chlorine residual again following the procedure described in "Starting Up the Chlorinator."

SUPPLIES & OPTIONAL ITEMS

The following items can be ordered from JET-CHLOR Dealers. Write Jet Inc. for the name of your local dealer.

- 5-pound pails of JET-CHLOR Disinfecting Tablets 27
- 25-pound pails of JET-CHLOR Disinfecting Tablets 67
- 45-pound pails of JET-CHLOR Disinfecting Tablets 105
- 100-pound drums of JET-CHLOR Disinfecting Tablets
- Chlorine Test Kits and Mounting Brackets

10-Year Limited Warranty

Jet Inc. warrants every new JET-CHLOR Tablet Chlorinator against defective materials and workmanship under normal service (providing chlorine disinfection for wastewater treatment) when installed and operated according to Jet's written instructions for ten (10) years commencing upon date of purchase by the original purchaser.

THIS WARRANTY IS NOT EFFECTIVE UNLESS THE ENCLOSED JET-CHLOR CHLORINATOR WARRANTY REGISTRATION CARD IS RETURNED TO JET INC. WITHIN TWENTY (20) DAYS OF DATE OF PURCHASE BY THE ORIGINAL PURCHASER.

This warranty applies only to use of the JET-CHLOR Tablet Chlorinator at the location in which the unit is originally installed.

If in-warranty repairs are needed, the chlorinator will be repaired or replaced, at Jet's option at the factory with no charge for labor or materials when returned to Jet Inc. by the distributor or dealer from whom the chlorinator was purchased or by the original purchaser within the warranty. If there are missing parts an additional charge will be made. The purchaser shall assume all freight charges to and from the factory.

The warranty does not cover chlorinators that have been disassembled by unauthorized persons, improperly installed, damaged by lightning, subjected to external damage, or damage by failure to follow the suggestions outlined in the Installation and Operation Manual. The warranty applies only to the JET-CHLOR Tablet Chlorinator and does not include any of the plumbing, drainage, or any other part of the disposal system.

JET INC. SHALL NOT BE HELD RESPONSIBLE FOR ANY DAMAGES CAUSED BY DEFECTIVE COMPONENTS OR MATERIALS, OR FOR LOSS INCURRED BECAUSE OF THE INTERRUPTION OF SERVICE, OR ANY OTHER SPECIAL CONSEQUENTIAL, OR INCIDENTAL DAMAGES OR EXPENSES ARISING FROM THE MANUFACTURE, SALE, USE OR MISUSE OF THE TABLET CHLORINATOR. THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESS WARRANTIES. ANY WARRANTY IMPLIED BY LAW, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS, IS LIMITED TO THE TEN YEAR PERIOD SPECIFIED ABOVE. (SOME STATES DO NOT ALLOW EXCLUSIONS OR LIMITATIONS OF INCIDENTAL OR CONSEQUENTIAL DAMAGES OR ALLOW LIMITATIONS OF HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.)

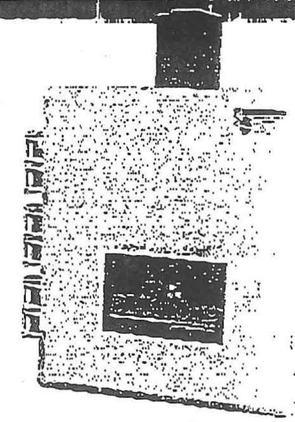
The company reserves the right to revise, change, or modify the construction and design of JET-CHLOR Tablet Chlorinators or any component part or parts thereof, without incurring any obligation to make such changes or modifications in present equipment.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

JET INC. • 750 Alpha Drive • Cleveland, Ohio 44143 • U.S.A. • 440/461-2000 • FAX 440/442-9008

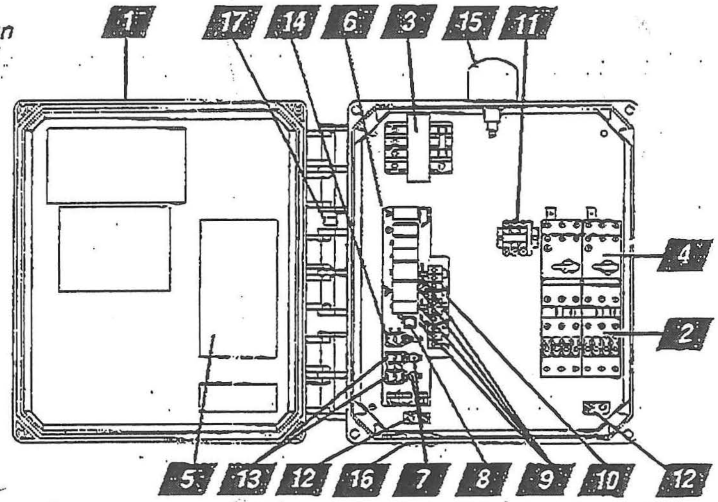
MODEL 322 Control Panel

Three phase, duplex alternating pump control with override.



The Model 322 control panel is designed to alternately control two three phase pumps in industrial and commercial water and sewage systems. The alternating action equalizes pump wear. In addition to the alternating pump control, this system provides override control should either pump fail. If an alarm condition occurs, the alarm switch activates the audio/visual alarm system. Common applications include lift stations, pump chambers, and irrigation systems.

Model Shown 3221W151X



1. Enclosure measures 14 x 12 x 6 inches (35.56 x 30.48 x 15.24 cm) NEMA 4X (ultraviolet stabilized thermoplastic with removable flanges for outdoor or indoor use).
2. IEC Motor Contactors control pumps by switching electrical lines.
3. Multi-Tap Transformer (208/240/480 VAC primary) provides 120V control voltage.
4. Motor Protective Switches provide adjustable overload, branch circuit protection and pump disconnect.
5. Schematic Wiring Diagram
6. Alternating Circuit Board provides pump control and alternation (U.S. Patent # 5,909,532).
7. Green Pump Run Indicator Lights (mounted on circuit board).
8. Alarm Fuse/Control Fuse (mounted on circuit board).
9. Float Status Indicator Lights (mounted on circuit board).
10. Float Switch Terminal Block (mounted on circuit board).
11. Input Power Terminal Block
12. Ground Lug
13. HOA Switches for manual pump control (mounted on circuit board).

STANDARD ALARM PACKAGE (other options available)

14. Control ON/OFF Switch (mounted on circuit board).
15. Red Alarm Beacon provides 360° visual check of alarm condition.
16. Alarm Horn provides audio warning of alarm condition (83 to 85 decibel rating).
17. Exterior Alarm Test/Normal/Silence Switch allows horn and light to be tested or horn to be silenced in an alarm condition. Horn automatically resets once alarm condition is cleared.

FEATURES

- Entire control system (panel and switches) is UL Listed to meet and/or exceed industry safety standards
- Dual safety certification for the United States and Canada
- Standard package includes three 20' Sensor Float® control switches
- Complete with step-by-step installation instructions
- Three-year limited warranty

[illegible]

246 Eisenhower Lane North
Lombard, Illinois 60148
Telephone: 630-495-4700 • Fax: 630/495-1081
e-mail: jtossing@ryanherco.com

800/848-1141 — www.ryanherco.com

322	0	W	171	8	8A-8C-17A

MODEL 322

ALARM PACKAGE
- [X] 0 = select options or no alarm package
- [ ] 1 = alarm package (includes test/normal/silence switch, fuse, red light, horn & float)

ENCLOSURE RATING
- [✓] W = Weatherproof, NEMA 4X (engineered thermoplastic)

PUMP FULL LOAD AMPS
- [ ] 111 = 1.1-1.6 FLA
- [ ] 121 = 1.4-2 FLA
- [ ] 131 = 1.8-2.5 FLA
- [ ] 141 = 2.2-3.2 FLA
- [ ] 151 = 2.8-4 FLA
- [ ] 161 = 3.5-5 FLA
- [X] 171 = 4.5-6.3 FLA
- [ ] 181 = 5.5-8 FLA
- [ ] 191 = 7-10 FLA
- [ ] 211 = 9-12.5 FLA
- [ ] 221 = 11-16 FLA
- [ ] 231 = 14-20 FLA
- [ ] 241 = 17-22 FLA
- [ ] 251 = 20-25 FLA

FLOAT SWITCH APPLICATION
- [X] H or L = pump down or pump up
- [ ] X = no floats

OPTIONS *Listed below*

YOUR CHOICE

★ ENCLOSURE UPSIZE - If you selected one or more of the ★ options.

If additional features are required, call the factory for a quote on either a Packaged Custom Control

	CODE	DESCRIPTION
[ ]	1A	Red beacon only / no audio
[ ]	1C	Horn only / no visual
[ ]	3A	Alarm flasher
[ ]	★ 4A	Low level cutout *select option 4D if floats included*
[ ]	★ 4B	Red low-level indicator & alarm *must select 4A also*
[ ]	4D	Redudant off float switch
[ ]	★ 5A	Thermal cutout/heat sensor auto reset (for pumps w/thermal switch leads)
[ ]	★ 5E	Seal failure circuit & red indicator (2 wire)
[ ]	6A	Auxiliary alarm contact, form C
[X]	8A	Elapsed time meter
[X]	★ 8C	Event (cycle) counter
[ ]	10A	Clear inner swing-out door w/dead front (components mounted on inner door)
[ ]	10E	Lockable latch
[ ]	10G	Lightning arrestor
[ ]	10K	Anti-condensation heater
[ ]	11C	NEMA 1 alarm panel-select option 6A
[ ]	11D	NEMA 4X alarm panel-select option 6A
[ ]	★14B	Main disconnect (rotary style, mounted through door) non-fused
[ ]	★	0-10 FLA (total of both pumps)
[ ]	★	11-20 FLA (total of both pumps)
[ ]	★	21-50 FLA (total of both pumps)
[ ]	16A	10' cord in lieu of 20'
[ ]	16B	15' cord in lieu of 20'
[ ]	16C	30' cord in lieu of 20'
[ ]	16D	40' cord in lieu of 20'
[X]	17A	SJE SignalMaster® / mounting strap ●
[ ]	17B	SJE SignalMaster® / externally weighted ●
[ ]	17C	Sensor Float® / internally weighted ▲
[ ]	17D	Sensor Float® / externally weighted ▲
[ ]	17E	Sensor Float® Mini / pipe clamp ▲
[ ]	17F	Sensor Float® Mini / externally weighted ▲
[ ]	19F	Fourth float to separate alarm function from lag
[ ]	19G	Panel wired to accept fourth control switch
[ ]	19X	Door mounted pump run indicator

● Mechanically-activated ▲ Mercury-activated

SAMPLE

MODEL	322	1	W	191	H	8AC

Alarm Package
Enclosure Rating
Pump Full Load Amps
Float Switch Application
Options: Elapsed Time Meter, Event (cycle) Counter

FAX TRANSMISSION

246 Eisenhower Lane North
Lombard, IL 60148

FROM	Ryan Herco Products Corp Joe Tossing
TO	Neil Morstadt

Page(s)	1	
12 /	12/5/00	10:43 AM

Message

Neil,

Please note the part number change for the control panel as we discussed. The full load amp values referenced in the serial number applies to EACH pump.

(1) 322-O-W-171-8A-8C-17A Your net/ea $ 1770.00

Thank you for your interest in Ryan Herco Products and allowing us to quote upon your needs. Should you have any questions or wish to place an order, please do not hesitate to contact either myself, or Dan Heinz of the inside sales group at our Chicago Service Center.

Best Regards,

Joe Tossing

Fax : 630-495-1086 | Phone : 630-495-4700 ext. 115

General Terms Of Sale For Products

1. GENERAL
A. Seller's price is based on these sales terms and conditions. This contract shall represent the final, complete and exclusive statement of the agreement between the parties and may not be modified, supplemented, explained or waived by parol evidence, any Terms and Conditions contained in Buyer's purchase order or request for quotation, any course of dealings between the parties, Seller's performance or delivery, or in any other way. The Terms and Conditions of this contract may only be modified or waived in a written document signed by an Officer of Seller. These terms are intended to cover all activity of Seller and Buyer hereunder, including sales and use of products, parts and work and all related matters (references to products include parts and references to work include construction, installation and start-up). Any reference by Seller to Buyer's specifications and similar requirements are only to describe the products and work covered hereby and no warranties or other terms therein shall have any force of effect. Any information provided by Seller, including but not limited to suggestions as to specific equipment does not imply any guarantee of specific suitability and/or material compatibility in a particular application since many factors outside the control of Seller may affect the suitability of products in a particular application. Catalogs, circulars and similar pamphlets of the Seller are issued for general information purposes only and shall not be deemed to modify the provisions hereof.

B. The agreement formed hereby and the language herein shall be construed and enforced under the Uniform Commercial Code as in effect in the State of California on the date hereof.

2. TAXES
Any sales, use or other similar type taxes imposed on this sale or on this transaction are not included in the price. Such taxes shall be billed separately to the Buyer. Seller will accept a valid exemption certificate from the Buyer if applicable; however, if an exemption certificate previously accepted is not recognized by the governmental taxing authority involved and the Seller is required to pay the tax covered by such exemption certificate. Buyer agrees to promptly reimburse Seller for the taxes paid.

3. PERFORMANCE, INSPECTION AND ACCEPTANCE
A. Unless Seller specifically assumes installation, construction or start-up responsibility, all products shall be finally inspected and accepted within thirty (30) days after arrival at point of delivery. Products not covered by the foregoing and all work shall be finally inspected and accepted with thirty (30) days after completion of the applicable work by Seller. All claims whatsoever by Buyer (including claims for shortages) excepting only those provided for under the WARRANTY AND LIMITATION OF LIABILITY and PATENTS Clauses hereof must be asserted in writing by Buyer within said thirty (30) day period or they are waived. If this contract involves partial performance, all such claims must be asserted within said thirty- (30) day period for each partial performance. There shall be no revocation of acceptance. Rejection may be only for defects substantially impairing the value of products or work and Buyer's remedy for lesser defects shall be those provided for under the WARRANTY AND LIMITATION OF LIABILITY Clause.

B. Seller shall not be responsible for non-performance or for delays in performance occasioned by any causes beyond Seller's reasonable control, including, but not limited to, labor difficulties, delays of vendors or carriers, fires, governmental actions, or shortages of material, components, labor, or manufacturing facilities. Any delays so occasioned shall affect a corresponding extension of Seller's performance dates, which are, in any event, understood to be approximate. In no event shall Buyer be entitled to incidental or consequential damages for late performance or for a failure to perform. Seller reserves the right to make partial shipments and to ship products, parts or work which may be completed prior to the scheduled performance date.

C. In the event that Seller has agreed to mount motors, turbines, gears, or other products which are not manufactured by Seller and which are not an integral part of Seller's manufactured product, and a delay in the delivery of such products to Seller occurs that will cause a delay in Seller's performance date, Seller reserves the right to ship its product upon completion of manufacture and to refund an equitable portion of the amount originally included in the purchase price for mounting without incurring liability for non-performance.

D. Seller reserves to itself the right to change its specifications, drawings and standards if such changes will not impair the performance of its products, and parts, and further that such products, and parts, will meet any of Buyer's specifications and other specific product requirements which are a part of this agreement.

E. The manufacture and inspection of products and parts shall be to Seller's Engineering and Quality Assurance standards plus such other inspections, tests of documentation as are specifically agreed to by Seller. Requirements for any additional inspection, tests, documentation, or Buyer witness of manufacture, test, and/or inspection shall be subject to additional charges.

4. TITLE AND RISK OF LOSS
Title and risk of loss shall pass to buyer upon delivery of products at the designated Ex Works place (Incoterms 1990) unless other wise agreed by the parties.

5. EROSION AND CORROSION
It is specifically understood that products and parts sold hereunder are not warranted for operation with erosive or corrosive fluids. No product or part shall be deemed to be defective by reason of failure to resist erosive or corrosive action of any fluid and Buyer shall have no claim whatsoever against Seller therefore.

6. WARRANTY AND LIMITATION OF LIABILITY
A. Seller warrants only that its product and parts, when shipped, will be free from defects in materials and workmanship. With respect to products and parts not manufactured by Seller, Seller's only obligation shall be to assign to Buyer, to the extent possible, whatever warranty Seller requires from the manufacturer. All claims for defective products or parts under this warranty must be made in writing immediately upon discovery and, in any event, within one (1) year after initial start-up or eighteen (18) months after shipment, whichever first occurs, and all claims for defective work must be made in writing immediately upon discovery and in any event, within one (1) year of completion thereof by Seller.
Defective items must be held for Seller's inspection and returned to the original f.o.b. point upon request.
THE FOREGOING IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES WHATSOEVER, EXPRESS, IMPLIED AND STATUTORY, INCLUDING WITHOUT LIMITATION, THE IMPLIED, WARRANTIES OF MERCHANTABILITY AND FITNESS.

B. ANY PRODUCT (S) SOLD HEREUNDER WHICH IS NOT MANUFACTURED BY SELLER IS NOT WARRANTED BY SELLER and shall be covered only by the express warranty, if any, of the manufacturer thereof.

C. Upon Buyer's submission of a claim as provided above and its substantiation, Seller shall at its option either (i) repair or replace its product, part or work at the original place of delivery, or (ii) refund an equitable portion of the purchase price.

D. THE FOREGOING IS SELLER'S ONLY OBLIGATION AND BUYER'S EXCLUSIVE REMEDY FOR BREACH OF WARRANTY AND, EXCEPT FOR GROSS NEGLIGENCE, WILLFUL MISCONDUCT, AND REMEDIES PERMITTED UNDER THE PERFORMANCE, INSPECTION AND ACCEPTANCE AND THE PATENTS CLAUSES HEREOF, THE FOREGOING IS BUYER EXCLUSIVE REMEDY AGAINST SELLER FOR ALL CLAIMS ARISING HEREUNDER OR RELATING HERETO WHETHER SUCH CLAIMS ARE BASED ON BREACH OF CONTRACT. TORT (INCLUDING NEGLIGENCE) OR OTHER THEORIES. BUYER'S FAILURE TO SUBMIT A CLAIM AS PROVIDED ABOVE SHALL SPECIFICALLY WAIVE ALL CLAIMS FOR DAMAGES OR OTHER RELIEF, INCLUDING BUT NOT LIMITED TO CLAIMS BASED ON LATENT DEFECTS. IN NO EVENT SHALL BUYER BE ENTITLED TO INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, NOR FOR DAMAGES FOR LOSS OF USE, LOST PROFITS OR REVENUE, INTEREST, LOST GOODWILL, WORK OR PRODUCTION STOPPAGE, IMPAIRMENT OF OTHER GOODS, INCREASED EXPENSES OF OPERATION, OR THE COST OF PURCHASING REPLACEMENT POWER OR OTHER SERVICES BECAUSE OF SERVICE INTERRUPTIONS. FURTHERMORE, IN NO EVENT SHALL SELLER'S TOTAL LIABILITY FOR DAMAGES OF BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS OR PARTS MANUFACTURED BY SELLER AND UPON WHICH SUCH LIABILITY IS BASED. ANY ACTION ARISING HEREUNDER RELATED HERETO, WHETHER BASED ON BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHER THEORIES, MUST BE COMMENCED WITHIN ONE (1) YEAR AFTER THE CAUSE OF ACTION ACCRUES OR IT SHALL BE BARRED.

7. PURCHASER'S REPRESENTATIONS & WARRANTIES
Purchaser represents and warranties that the products(s) covered by this contract shall not be used in or in connection with a nuclear facility or application. The parties agree that this representation and warranty is material and is being relied on by seller. This provision may be modified in a separate writing signed by an officer of PPC.

8. PATENTS
Seller agrees to assume the defense of any suit for infringement of any patents brought against Buyer to the extent of such suit charges infringement of an apparatus or product claim by Seller's product in and of itself, provided (i) said product is built entirely to Seller's design, (ii) Buyer notifies Seller in writing of the filing of such suit within ten (10) days after the service of process thereof, and (iii) Seller is given complete control of the defense of such suit, including the right to defend, settle and make changes in the product for the purpose of avoiding infringement of any process or method claims, unless infringement of such claims is the result of following specific instruction furnished by Seller.

9. EXTENT OF SUPPLY
Only products as listed in Seller's proposal are included in this agreement. It must not be assumed that Seller has included anything beyond same.

10. MANUFACTURING SOURCES
To maintain delivery schedules, Seller reservplants on a world-wide basis.
11. TERMS OF PAYMENT
Net 30 days from date of invoice.

Effective: January 1, 1999

Price® Pump Company

Type XT/XL
Installation, Operating and Maintenance Manual

Caution:
Before installing, repairing or performing maintenance on this pump, read these instructions completely.

If pump has been used to pump hazardous materials be certain that all materials have been removed prior to working on the pump.

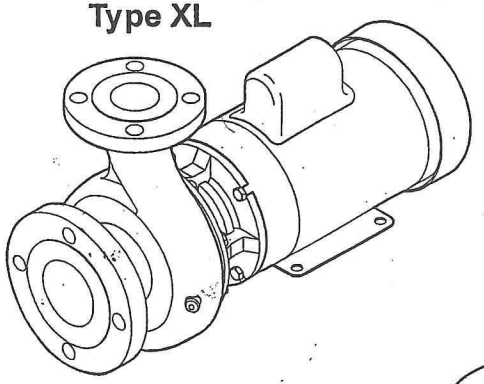
Warning!!
Ground motor before connection to electrical power supply!! Failure to ground motor can cause severe or fatal electrical shock hazard!!

Do not ground to gas supply line!!

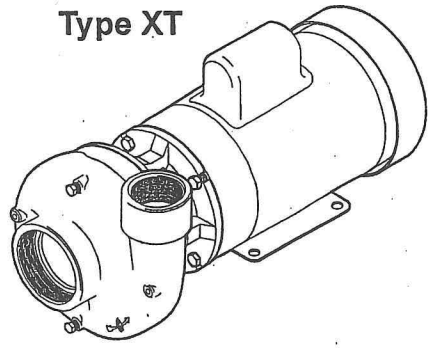
Match voltage to nameplate voltage on motor. Incorrect voltage can cause fire or seriously damage motor, voiding warranty.

Before disassembling be certain all liquid is removed from the pump.

Type XL



Type XT

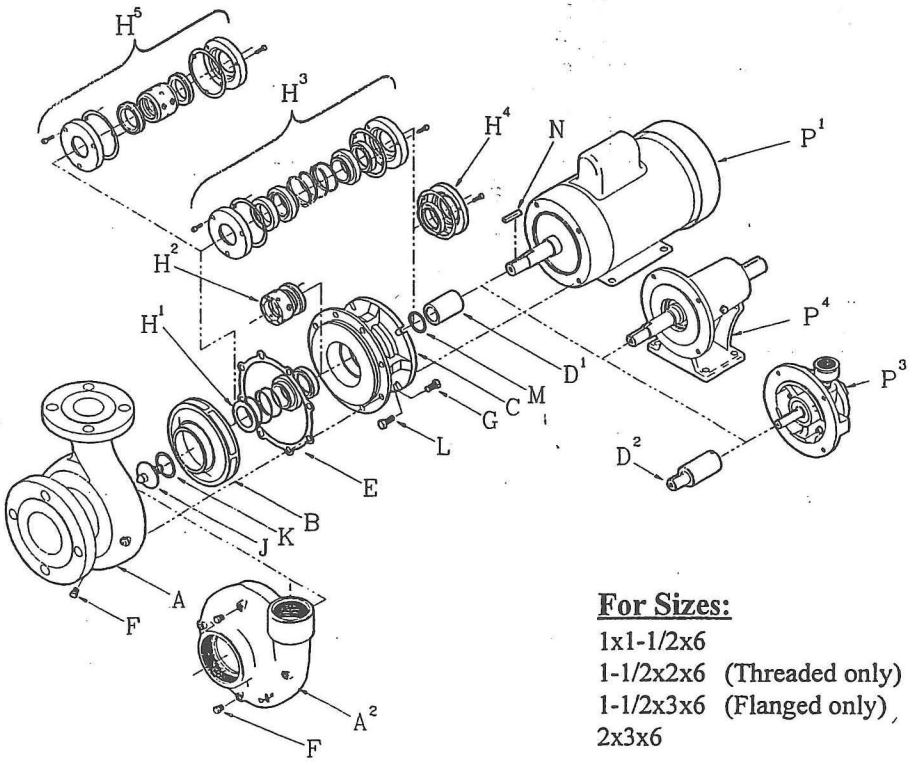


Parts List Type XT/XL Cont.

	All Models	
H2.	T.9 Teflon® Single Seal/Seat (opt)	0123
	Seat Pin T.9 (not shown)	0890
H3.	T.21 Double Seal/Seat (opt)	Specify P/N
	Double Seal Plate (2 rqd)	0309
	Plate Gasket, Teflon® (2 rqd)	0505
	Plate Bolts (6 rqd)	0977
H4.	Seal Quench (opt):	
	Buna Lip Seal	0756
	Viton® Lip Seal	0757
	Teflon® Lip Seal	0758
	Lip Seal Plate	0309-2
	Plate Gasket, Teflon®	0505
	Plate Bolts (3 rqd)	0977
H5.	T.9 Teflon® Double Seal/Seat (opt)	0670
	Double Seal Plate (2 rqd)	0309-1
	Plate Gasket, Teflon® (2 rqd)	0505
	Plate Bolts (6 rqd)	0977
	Seat Pin T.9 (2 rqd not shown)	0890

	All Models	
J.	Impeller Lockdown	0978
K.	Lockdown Gasket, Teflon®	0245
L.	Motor Bolts	
	All Bronze pumps (4 rqd)	0587
	Stainless Steel pumps (4 rqd)	0593
	AI & CIBF pumps (4 rqd) and	0593
	order Washers (4 rqd)	1137
M.	Sleeve Gasket, Teflon®	0245
N.	Impeller Shaft Key	0135
P1.	JM Motor	Specify P/N
P3.	Air Motor	Specify P/N
P4.	Power Frame	5480

Type XT/XL Parts List



AI = All Iron
BF = Bronze Fitted
AB = All Bronze
SS = Stainless Steel

For Sizes:
1x1-1/2x6
1-1/2x2x6 (Threaded only)
1-1/2x3x6 (Flanged only)
2x3x6

Parts List Type XT/XL

		AI Threaded	BF Threaded	AB Threaded	SS Threaded	SS Flanged
A.	Volute					
	XT/XL 100	2601	2601	2603	2629	2605
	XT/XL 150	2607	2607	2609	2626	2611
	XT/XL200	2613	2613	2615	2627	2617
B.	Impeller Specify diameter					
	XT/XL100	2602-dia	2604-dia	2604-dia	2606-dia	2606-dia
	XT/XL150	2608-dia	2610-dia	2610-dia	2612-dia	2612-dia
	XT/XL200	2614-dia	2616-dia	2616-dia	2618-dia	2618-dia
	Note: For Dbl seal add DS (Sample: 2614DS-dia)					
C.	Bracket (std)	0131	0131	0132	0979	0979
	Double Seal	0131-1	0131-1	N/A	0979-1	0979-1
	Single Flush	0131-2	0131-2	0132-2	0979-2	0979-2
	Quench	0131-3	0131-3	N/A	0979-3	0979-3
	Internal Flush	0131-4	0131-4	N/A	0979-4	0979-4
D1.	Shaft Sleeve	0127	0126	0126	0127	0127
D2.	Stub Shaft 5/8" ID	0329-1	0329-1	0329-1	0329-1	0329-1
D3.	Stub Shaft 7/8" ID	0328-1	0328-1	0328-1	0328-1	0328-1
E.	Volute Gasket	0124	0124	0124	0301	0301
F.	Pipe Plug	0557	0557	0558	0559	0559
G.	Volute Bolts	0583	0583	0587	0724	0724
H1.	T.21 Seal/Seat	0121	0121	0121	0122	0122

Continued on next page

3b. On JM style motors, apply Loctite RC/609 to inside diameter of shaft sleeve. Install shaft sleeve onto motor shaft making sure that the groove for the Teflon® sleeve gasket is facing the pump end. Clean excess Loctite from shaft. Be sure sleeve is seated against motor shaft shoulder.

4. For Type 21, 8, and 9 seals: Place the bracket on a firm surface with the seat cavity (pump end) up. Then place a small amount of vegetable oil on the seat cup or "O" ring seat. Place the seat in the seal cavity with the polished face up toward the pump end. Evenly push seat into seat cavity with fingers, then then gently tap seat into place with a wooden dowel or plastic rod (2" outside diameter). To help ensure the seat is not damaged, place the cardboard disk supplied with the seal under the end of the dowel to prevent damaging the seat face.

5. Place bracket on motor (aligning the base if applicable). Secure bracket to motor with four motor bolts and washers.

6. Install seal head assembly:

   For Type 21:

   a. Lubricate shaft and elastomer with vegetable oil.

   b. Install rotary seal head onto pump shaft and slide toward seat using a twisting motion until carbon face touches seal seat.

   c. For 145JM through 215JM frame pumps, install new sleeve gasket into shaft sleeve. For 254JM through 256JM, install new gasket into hub of impeller.

   d. Install seal spring and retainer over shaft sleeve.

   e. Install impeller onto motor shaft being careful to align keyway of impeller with keyway in motor shaft. Push impeller on until impeller bottoms out on shaft sleeve. Install key in keyway.

   f. Install impeller lockdown gasket and impeller lockdown. Tighten securely.

   For Type 8 or Type 9:

   a. Do not remove metal clips from seal head assembly. Place seal on shaft sleeve sliding gently past shoulder.

   b. Slide seal head toward seat until carbon face contacts ceramic seat. Tighten seal head setscrews to shaft sleeve using short arm allen wrench supplied with seal or repair kit. Remove clips in seal head and discard.

   c. For 145JM through 215JM frame pumps, install new sleeve gasket into shaft sleeve. for 254JM through 256JM, install new gasket into hub of impeller.

   d. Install impeller onto motor shaft, being careful to align keyway of impeller with keyway in motor shaft. Push impeller on until impeller bottoms out on shaft sleeve. Install key in keyway.

   e. Install impeller lockdown gasket and impeller lockdown. Tighten securely.

7. Install new volute gasket. Ensure that all of the mating surfaces of the gasket joint are cleaned to bare metal.
8. Install volute and secure with 8 bolts and tighten evenly.

9. Rotate pump shaft by hand to ensure impeller does not rub against volute.

10. Return pump to installation, reconnect electric connections.

11. Start pump momentarily to observe shaft rotation. If rotation corresponds to the rotation arrow on the pump, it may be put into service. If rotation is incorrect, switch any two leads on 3-phase motors to change rotation. Check wiring diagram of motor for single phase rotation correction.

12. Remove top pipe plug (if applicable) from the front of volute and prime pump thoroughly, making sure all air is purged. Turn shaft one revolution and then refill. Replace the pipe plug.

13. Start pump allowing adequate time to purge all air from system. Observe any gauges, flow meters, etc., to see if pump performs properly.

TROUBLESHOOTING

1.Pump fails to build pressure:
Check for:
a. Pump not primed.
b. Incorrect rotation.
c. Driver speed too low.
d. Suction line restricted.
e. Driver failure.
f. Plugged or damaged impeller.
g. Pump or impeller undersized.
h. Pump cavitation.
i. Improper impeller clearance.

2.Pump fails to provide enough flow.
Check for:
a. System resistance too high.
b. Pump undersized.
c. Pump not primed.
d. Driver speed too low.
e. Poor suction conditions.
f. Improper impeller clearance.

3.Excessive noise or vibration during operation.
Check for:
a. Motor bearing failing.
b. Pump cavitating.
c. Improper impeller clearance.

4.Leaking mechanical seal.
Check for:
a. Improper assembly.
b. Worn or cracked seal faces.
c. Abrasive material in fluid.
d. Liquid flashing at seal faces (fluid temperature too high).
e. Seal pressure rating too low for the service.
f. Chemical attack of seal parts.
g. Seal operated dry or with a liquid having poor lubricating properties.

5.Pump gradually loses pressure and head.
Check for:
a. Increasing temperature causing cavitation or liquid vaporization.
b. Driver failure.
c. Suction lift too high.
d. Air entering suction line.

6.Motor/pump overheating.
Check for:
a. Excessive flow and amp draw (Throttle discharge).
b. Low voltage or frequency.
c. Flow too low with resulting heat rise.
d. Bearing failure.
e. System temperature too high.

TYPE XT/XL MAINTENANCE AND REPAIR

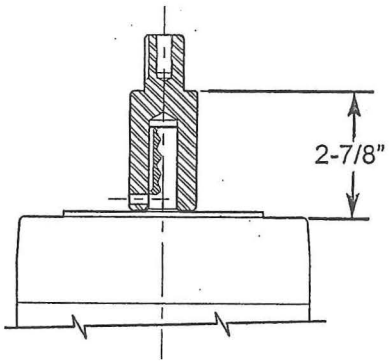
DISASSEMBLY

1. Disconnect power source from motor.
2. Disconnect electrical connections, tagging wires carefully to preserve correct rotation. Loosen pump base.
3. Remove pump and motor assembly to repair area. Observe position of all parts prior to disassembly.
(Note: volute may be left in piping.)
4. Remove 8 volute bolts and remove volute from pump.
5. Remove impeller. Remove impeller lockdown by turning CCW. Slide impeller off of the shaft. Save shaft key.
6. Remove seal head from the shaft. On type 9 seal, loosen set screws and slide seal from shaft. On type 21, remove seal by sliding it off of the shaft.
7. Remove the four motor bolts and remove bracket from motor.
8. Remove seal seat from bracket. Use wooden or plastic dowel to tap the seat from the bracket. Diagram A
9. Remove shaft or shaft sleeve. Heat shaft sleeve to approximately 300^{o}F and use a bearing puller to remove the sleeve.

REASSEMBLY

1. Clean seal cavity of the bracket thoroughly.
2. Thoroughly clean pump shaft. Assure that the shaft is not grooved and that there is no evidence of pitting or fretting. Polish the shaft with extra fine emery cloth and clean the keyway.

3a. On 56C motors, (stub shaft pumps only), ensure all debris and burrs are removed from the motor shaft. Align halfdog setscrew with motor keyway while sliding stub shaft over the motor shaft. Set height (diagram A). Tighten all set screws.



Reassembly Instructions continued on next page →

Close Coupled Motor Pumps

These pumps require no special care in mounting, although it is suggested that they be firmly bolted to a level surface. Adequate air movement over motor will help prevent overloads.

Power Frame Mounted Pumps

These pumps must be mounted on a rigid steel base that will not warp or flex. Each pump must be mounted such that **the pump shaft centerline is on center with the driver shaft centerline.** Pad and/or shims will be required on either pump, driver or both. The two shafts should not touch each other and the distance between them depends on the coupling used to connect them. **Misalignment will cause bearing failure and void warranty. Pumps are rough aligned at the factory but must be realigned after shipment and installation.** Pulley driven pump must have pulleys inline and good belt tightness practices followed.

Direction of Rotation

Note: Motor shaft rotation is viewed from the suction end of pump. A rotational arrow is shown on the front of the pump volute casing. Incorrect rotation can cause pump damage, failure or reduced performance, voiding warranty. It is best to check rotation by momentarily energizing or jogging the motor prior to filling pump with liquid.

Warning! Do not operate pump without liquid for more than a few seconds, as damage will result to mechanical seal.

PLUMBING

All piping should be supported independently of the pump. Piping should not exert any stress on the pump connections.

Suction Piping Horizontal Pumps

Suction line must provide adequate suction pressure and smooth liquid flow for proper pump operation. Air entrapment in the suction line because of leaks or improper design may cause the pump to lose prime and fail. This pump is not self-priming, therefore the suction must be flooded at start up. Also, the suction line must provide sufficient pressure and smooth flow to pump inlet to prevent pump cavitation. A length of straight pipe a minimum of 5 times the pump inlet diameter and preferably 10 times the diameter should be installed in the suction line where it enters the pump. Elbows, fittings or valves installed close to the suction can disrupt liquid flow and cause malfunction. Suction lines must be at least the same size as the pump inlet or larger if possible.

Price Pump Co. recommends against using foot valves in the suction line to maintain liquid in the pump when it's not operating. If foot valves are used due to suction lift conditions they must be properly maintained to avoid leaks resulting from wear or fouling. Suction piping must be designed to prevent air from being trapped in high spots in the piping. This condition may cause the pump to vapor lock as the air bubble moves into the pump.

Discharge Piping

For flow and discharge head control it is advisable to install a valve (globe, ball, or other adjustable and non-leak type) in the discharge line close to the pump. The valve may be closed during system repairs to prevent backflow. By installing a check valve in the discharge line backflow can also be prevented during maintenance or during periods of pump stoppage.

OPERATION

Priming-

All centrifugal pumps must be filled with liquid prior to start up. For the pump illustrated in this manual completely fill the volute and suction lines prior to operation. It is suggested that during initial start up the discharge valve be closed and then opened as the motor develops full rpm's. If pump does not build up pressure as motor speed increases, shut down and make sure that liquid flow into pump is not restricted (see "Troubleshooting").

Note: A centrifugal pump's flow and head (pressure) will vary with the amount of resistance (friction and flow restrictions) in the discharge line. As a valve on the discharge line opens the flow and motor amp draw will increase and head will drop. As a valve on the discharge is closed the flow and amp draw will decrease and the head will increase. If resistance in the discharge line is not sufficient the pump will operate at a condition of maximum (or "choked") flow, also sometimes called "end of performance curve." Maximum horsepower is required to operate at this point and motor overload may result. If excessive amp draw and motor overload is recurring, reduce the system flow by installing a valve on the discharge line and restricting flow. Alternatively, reduce pump head by trimming impeller to a smaller diameter. Consult local Price Pump dealer for assistance.

Model 8 Basket Strainer and Bag Filters

Strainers or bag filters:
Your choice!

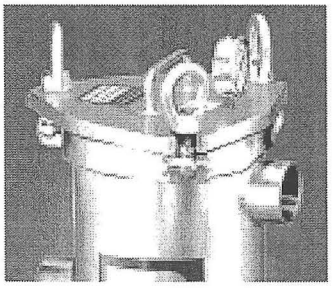
Model 8 strainer/filter housings are made in 2 sizes and 2 pressure ratings, and can serve as basket strainers (for particle retention down to 74 micron size) or as bag filters (for particle retention down to 1 micron size). In all cases, covers are easily removed, without tools, and the basket or bag is easily cleaned or replaced.

Features

- Low pressure drops
- Permanently piped housings
- Covers are O-ring sealed
- Carbon steel, or stainless steel (304 or 316) construction for housings
- All housings are electropolished to resist adhesion of dirt and scale
- Easy to clean!
- Adjustable-height legs, standard
- Large-area, heavy-duty baskets
- O-ring seals: Buna N, EPR, Viton®, Teflon®
- ASME code stamp available
- Two pressure ratings: 150 and 300
- Duplex units are available
- Pipe sizes 3/4 thru 6-inch, NPT or flanged
- Two basket depths: 15 or 30 inches (nominal)

Options

- Sanitary construction
- Different outlet connections
- Higher pressure ratings
- Extra-length legs
- Heat jacketing
- Adapters for holding filter cartridges.
- Liquid displacers for easier servicing
- Can be fitted with an adapter to hold cartridge filter elements



Covers are secured by three eye nut assemblies. One of them acts as a hinge, when the cover is opened.

Dual Stage Straining/Filter

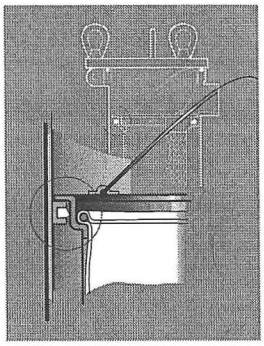
All Rosedale Model 8 housings can be supplied with a second, inner basket which is supported on the top flange of the regular basket. Both baskets can be strainers (with or without wire mesh linings) or both can be baskets for filter bags. They can also be mixed: one a strainer basket, the other a filter bag basket. Dual-stage action will increase strainer or filter life and reduce servicing needs.

Choosing A Basket Strainer Or Bag Filter

Choose between straining a fluid (removing particles down to 74 micron size) and filtering it (removing particles down to 1 micron). This will direct you in selecting the correct basket when ordering.

Operation

Unfiltered liquid enters the housing above the bag or basket and passes down through them. Solids are contained inside the bag or basket, where they're easily removed when the unit is serviced. A basket bail is pushed down by the closed cover to hold the basket against a positive stop in the housing. A radial seal prevents bypass of unfiltered liquid.



Pressure Drop Data

Basket strainers and bag filters are usually selected so that the pressure drop does not exceed 2 psi, when they are clean. Higher pressure drops may be tolerated, when contaminant loading is low.

The pressure drop data is accurate for all housings with strainer or filter bag baskets. When filter bags are added, total pressure drop becomes the sum of the pressure drop as determined by the steps below.

Follow these easy steps:

1. Using the desired pipe size and approximate flow rate, determine the basic pressure drop from the appropriate graph.
2. Multiply the pressure drop obtained in step 1 by the viscosity correction factor found in the accompanying table. This is the adjusted (clean) pressure drop for all baskets without filter bags.
3. Add the pressure drop for the bag.

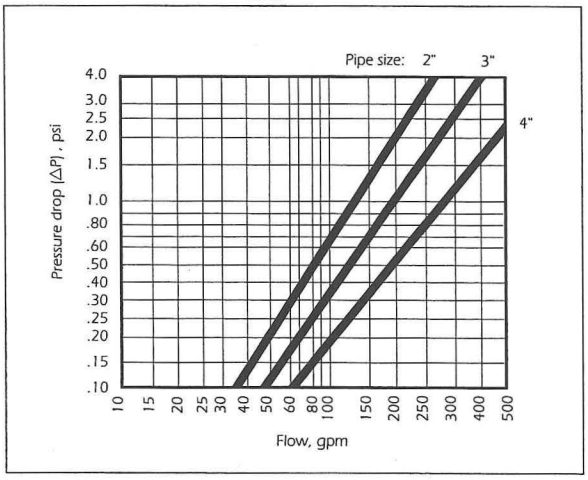
Note: Filter bags are specified separately. See page 106.

Basket Data

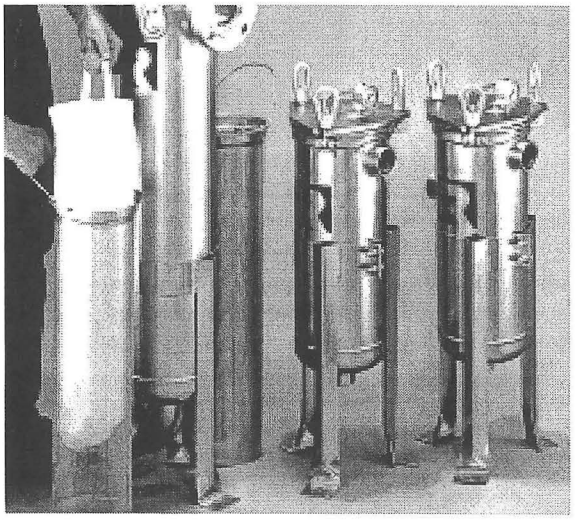
Depth Nominal (inches)	Diameter (inches)	Surface Area (sq. ft.)	Volume (cu. in.)	Bag Size No.
15	6.7	2.3	500	1
30	6.7	4.4	1000	2

	Viscosity, cps								
	1 (H_2O)	50	100	200	400	600	800	1000	2000
All unlined baskets	.65	.85	1.00	1.10	1.20	1.40	1.50	1.60	1.80
40-mesh lined	.73	.95	1.20	1.40	1.50	1.80	1.90	2.00	2.30
60-mesh lined	.77	1.00	1.30	1.60	1.70	2.10	2.20	2.30	2.80
80-mesh lined	.93	1.20	1.50	1.90	2.10	2.40	2.60	2.80	3.50
100-mesh lined	1.00	1.30	1.60	2.20	2.40	2.70	3.00	3.30	4.40
200-mesh lined	1.30	1.70	2.10	3.00	3.40	3.80	4.40	5.00	6.80

Model 8–For flow rates to 220 gpm*



*Based on housing only. Fluid viscosity, filter bag used, and expected dirt loading should be considered when sizing a filter.



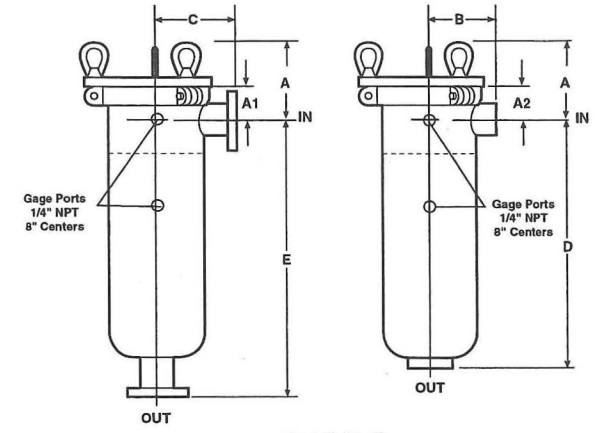
Eye nut covers with filter bag and basket.

Dimensions (IN)

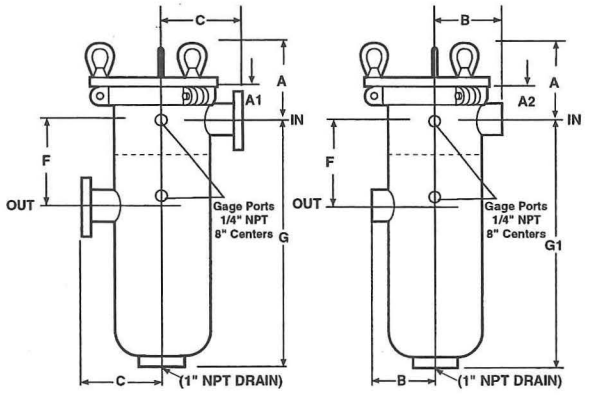
Outlet Styles

Flanged (150 lb. ANSI) | Threaded (NPT)

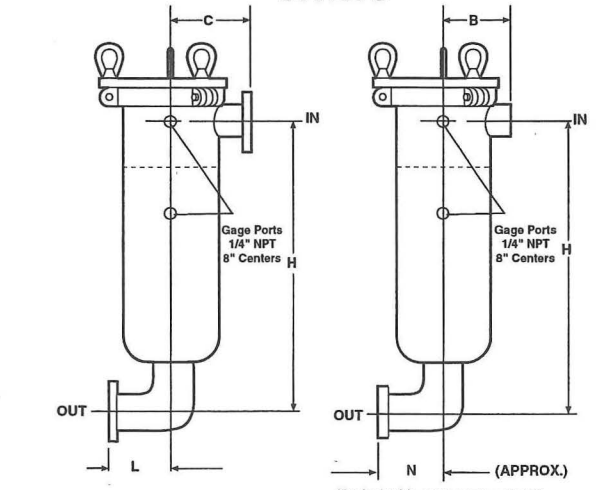
STYLE 1



STYLE 2



STYLE 3

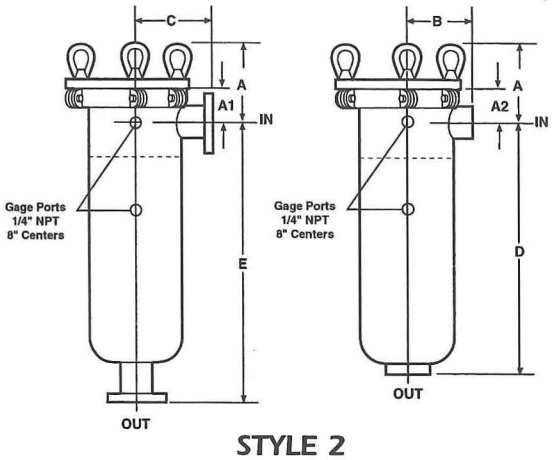


(Style 1 with customer's elbow)

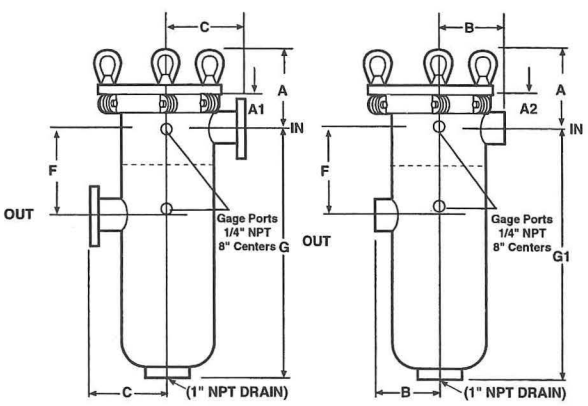
Outlet Styles

Flanged (300 lb. ANSI) | Threaded (NPT)

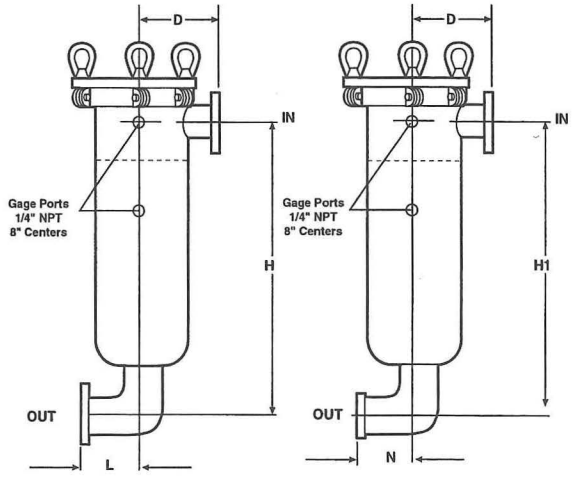
STYLE 1



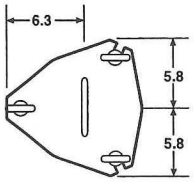
STYLE 2



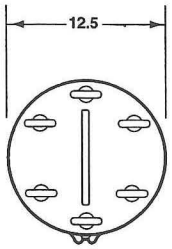
STYLE 3



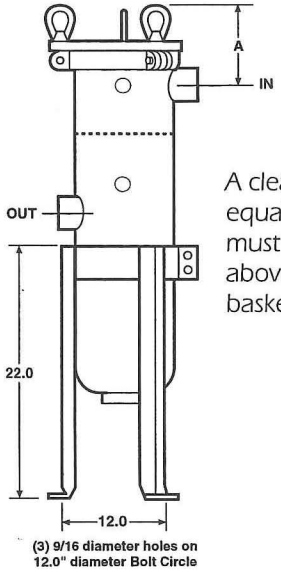
Cover Types



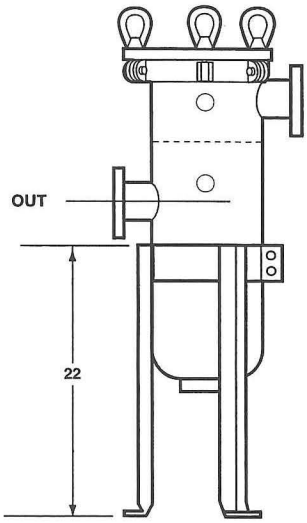
150 PSIG Design



300 PSIG Design



A clearance distance equal to basket depth must be available above housing for basket removal.



Dimensions (IN) 150 PSIG Design

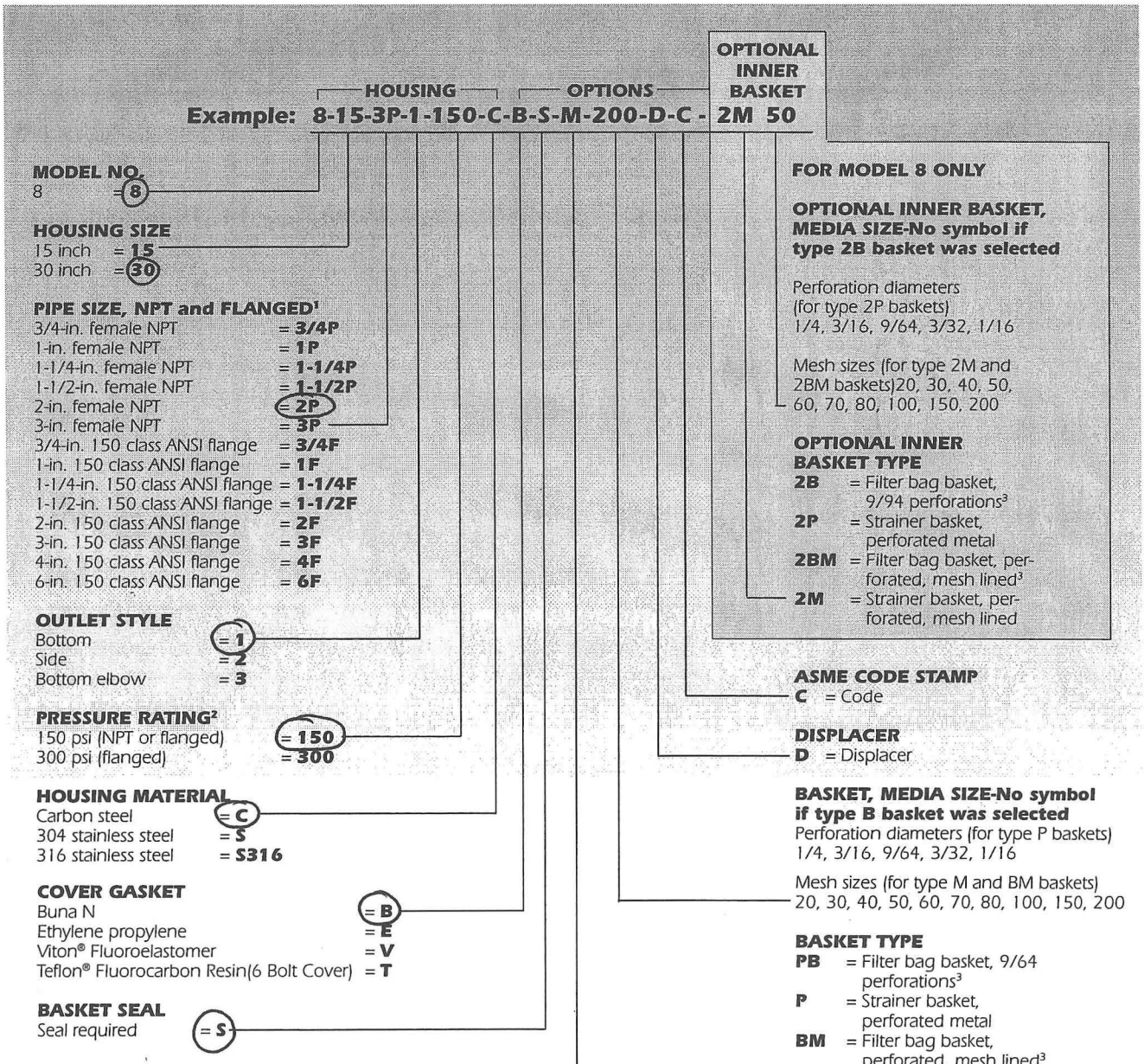
Model	Pipe Size	A	A1	A2	B	C	D	E	F	G	G1	H	H1	L	N
8-15	2	6.6	2.9	2.9	5.9	7.5	21.2	23.5	4.9	21.0	21.0	23.2	23.2	5.0	4.06
	3	7.5	3.7	3.7	6.8	7.5	22.5	24.6	6.6	21.9	21.9	25.4	25.4	7.25	6.12
	4	7.5	3.7	5.0	6.8	8.6	22.5	25.1	8.4	21.9	20.6	26.8	25.6	9.0	7.75
	6	9.0	5.2	5.9	7.1	8.6	23.6	26.0	9.0	23.4	22.8	30.9	30.3	12.5	11.0
8-30	2	6.6	2.8	2.9	5.9	7.5	36.2	38.5	4.9	36.0	36.0	38.2	38.2	5.0	4.06
	3	7.5	3.7	3.7	6.7	7.5	37.5	39.6	6.6	36.9	36.9	40.4	40.4	7.25	6.12
	4	7.5	3.7	5.0	6.7	8.6	37.5	40.1	8.4	36.9	35.6	41.8	40.6	9.0	7.75
	6	9.0	5.2	5.9	7.1	8.6	38.6	41.0	9.0	38.4	37.8	45.9	45.3	12.5	11.0

Dimensions (IN) 300 PSIG Design

Model	Pipe Size	A	A1/A2	B	C	D	E	F	G/G1	H/H1	L	N
8-15	2	7.6	3.8	5.9	7.5	21.2	23.5	4.9	21.0	23.2	5.0	4.06
	3	8.9	5.0	6.8	8.6	22.5	24.6	6.6	21.9	25.4	7.25	6.12
	4	8.9	5.0	6.8	9.6	22.5	25.1	8.4	21.9	26.8	9.0	7.75
	6	10.1	6.2	6.3	10.0	23.6	26.0	9.0	23.4	30.9	12.5	11.0
8-30	2	7.6	3.8	5.9	7.5	36.0	38.5	4.9	36.0	38.2	5.0	4.06
	3	8.9	5.0	6.8	7.5	36.7	39.6	6.6	36.9	40.4	7.25	6.12
	4	8.9	5.0	6.8	8.6	36.5	40.1	8.4	36.9	41.8	9.0	7.75
	6	10.1	6.2	7.1	8.6	38.6	41.0	9.0	38.4	45.9	12.5	11.0

How To Order

Build an ordering code as shown in the example



NOTE:

1. Flanges provided with the housing match the pressure rating of the vessel. Housings rated 150 psi have 150 class flanges. Housings rated 300 psi have 300 class flanges. ANSI B16.5 Pressure-Temperature rating tables determine flange class for ASME code housings. Consult factory.
2. Higher pressure ratings available. Consult factory.
3. Filter bags are specified separately. See page 106.
4. 150 psi unit has 150 class flanges. 300 psi unit has 300 class flanges.

Filter Bags

For filter bag housings, see pages 292-293. For information about micron ratings, see page 286.

About Filter Bags

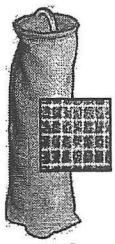
Filter bags serve as filtering media in filter bag housings. They are more efficient and economical than filter cartridges because they offer more surface area for higher dirt-holding capacity, resulting in fewer replacements. In addition, they are easier to replace because the dirt is trapped inside the bag.

Absolute rated filter bags will retain at least 99% of particles of a particular micron size. Nominal rated filter bags are not rated to a particular percentage of particles. Bags with a glazed finish have minimal fiber migration (the contamination of filtered liquid with fibers, such as felt, from the filter bag). Unless noted, filter bags are not reusable. To order a filter bag for your housing, use the following table as a guide:

Trade Size	Fits Housing Size Dia. × Ht.
1	8.6" × 15"
2	8.6" × 30"
3	4.5" × 6"
4	4.5" × 12"
8	6.6" × 18"
9	6.6" × 30"
12	8.6" × 30"

Felt Filter Bags

Polyester Felt



Heavy Duty Polyester Felt

These felt filter bags have a nominal efficiency rating.

Polyester Felt Filter Bags—A good general-purpose media bag. Excellent for use with organic solvents, microorganisms, and vegetable and petroleum oils. The bags also have good chemical compatibility with organic alkalies, mineral agents, and acids. Have a galvanized steel retaining ring, sewn-in polyester handle, and a glazed finish. Maximum temperature is 300 °F.

Heavy Duty Polyester Felt Filter Bags—Filter heavy metallic particles or extremely viscous liquids such as tar without worrying about your filter bag tearing. Interwoven polyester mesh provides extra strength to hold heavy particles. At replacement time, the bag is less likely to tear than standard polyester felt. Bag has a sewn-in steel ring, sewn-in handle, and a glazed finish. Maximum temperature is 325 °F.

Polypropylene Felt Filter Bags—Polypropylene construction offers a broad range of chemical compatibility and is FDA-compliant. Superior to polyester bags when filtering organic alkalies and oxidizing acids. Bags have an integral polyethylene ring (except as noted), built-in handle, and a glazed finish. Maximum temperature is 200 °F.

Nomex Felt Filter Bags—For high temperature applications in the harshest environments. These bags are often used in food and beverage processing and pharmaceutical applications. All bags have a stainless steel retaining ring and sewn-in Nomex handle. Maximum temperature is 400 °F.

Trade Size	Bag Size, Dia. × Lg.	Max. Flow, gpm	1 Micron	5 Micron	10 Micron	25 Micron	50 Micron	100 Micron	200 Micron	Each 1-9	Each 10-Up
Polyester Felt											
1	7" × 16.5"	100	5162K75	5162K34	5162K85	5162K36	5162K37	5162K39	5162K95	$2.96	$2.42
2	7" × 32"	200	5162K76	5162K44	5162K86	5162K46	5162K47	5162K49	5162K96	5.02	4.11
3	4.1" × 8"	25	5162K71	5162K12	5162K81	5162K14	5162K15	5162K16	5162K91	1.86	1.55
4	4.1" × 14"	50	5162K72	5162K18	5162K82	5162K21	5162K22	5162K23	5162K92	2.55	2.09
8	5.5" × 21"	100	5162K73	5162K51	5162K83	5162K53	5162K54	5162K56	5162K93	2.96	2.42
9	5.5" × 32"	150	5162K74	5162K61	5162K84	5162K63	5162K64	5162K66	5162K94	4.62	3.78
12	8.25" × 34"	275	5162K57	5162K58	5162K59	5162K87	5162K88	5162K89	5162K97	6.45	5.68
Heavy Duty Polyester Felt											
1	7" × 16.5"	43	6835K11	6835K12	6835K13	6835K14	6835K15	6835K16	6835K17	3.40	3.04
2	7" × 32"	85	6835K18	6835K19	6835K21	6835K22	6835K23	6835K24	6835K25	6.00	5.42
3	4.1" × 9"	20	6835K26	6835K27	6835K28	6835K29	6835K31	6835K32	6835K33	2.85	2.51
4	4.1" × 14.5"	35	6835K34	6835K35	6835K36	6835K37	6835K38	6835K39	6835K41	3.20	2.81
8	5.6" × 21"	42	6835K42	6835K43	6835K44	6835K45	6835K46	6835K47	6835K48	3.55	3.11
9	5.6" × 32"	80	6835K49	6835K51	6835K52	6835K53	6835K54	6835K55	6835K56	6.05	5.38
Polypropylene Felt											
1	7" × 16.5"	90	51595K51	51595K52	51595K53	51595K54	51595K55	51595K57	51595K58	4.41	3.43
2	7" × 32"	180	51595K61	51595K62	51595K63	51595K64	51595K65	51595K67	51595K68	5.97	4.64
3	4.1" × 8"	25	51595K11	51595K12	51595K13	51595K14	51595K15	51595K17	51595K18	2.94	2.35
4	4.1" × 14"	50	51595K21	51595K22	51595K23	51595K24	51595K25	51595K27	51595K28	3.84	2.99
8	5.5" × 20"	75	51595K31★	51595K32★	51595K33★	51595K34★	51595K35★	51595K37★	51595K38★	4.74	3.69
9	5.5" × 31"	90	51595K41★	51595K42★	51595K43★	51595K44★	51595K45★	51595K47★	51595K48★	5.50	4.28
12	8.25" × 34"	275	51595K71	51595K72	51595K73	51595K74	51595K75	51595K77	51595K78	6.35	5.67
Nomex Felt											
1	7" × 16.5"	90	51635K61	51635K62	51635K63	51635K64	51635K65	51635K67	51635K68	12.35	9.88
2	7" × 32"	180	51635K71	51635K72	51635K73	51635K74	51635K75	51635K77	51635K78	21.55	17.24
3	4.1" × 8"	25	51635K11	51635K12	51635K13	51635K14	51635K15	51635K17	51635K18	6.93	5.54
4	4.1" × 14"	50	51635K21	51635K22	51635K23	51635K24	51635K25	51635K27	51635K28	8.48	6.78
8	5.5" × 20"	75	51635K31	51635K32	51635K33	51635K34	51635K35	51635K37	51635K38	10.70	9.81
9	5.5" × 31"	90	51635K41	51635K42	51635K43	51635K44	51635K45	51635K47	51635K48	14.45	13.25
12	8.25" × 34"	275	51635K26	51635K36	51635K46	51635K56	51635K66	51635K76	_____	28.21	24.93

★ Galvanized steel ring.

High-Capacity Felt Filter Bags

With double the thickness of the felt filter bags above, these high-capacity filter bags have twice as much surface area available to trap particles. As a result, they have 2 to 3 times the life and dirt-holding capacity of conventional felt bags.

Bags have a Type 304 stainless steel support ring and glazed finish. Made with FDA-compliant materials. Nominal rated.

Polyester felt bags have a polyester built-in handle. Maximum temperature is 300 °F.

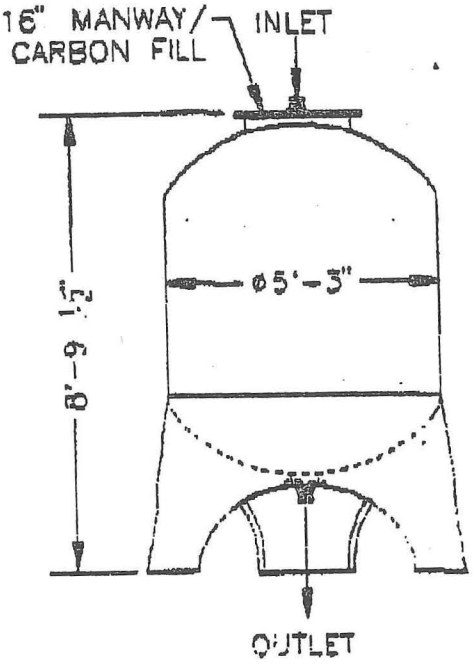
Polypropylene felt bags have a polypropylene built-in handle. Maximum temperature is 200 °F.

Trade Size	Bag Size, Dia. × Lg.	Max. Flow, gpm	1 Micron	5 Micron	10 Micron	25 Micron	50 Micron	100 Micron	Each 1-9	Each 10-Up
Polyester Felt										
1	7" × 16.5"	100	5726K11	5726K12	5726K13	5726K14	5726K15	5726K16	$8.06	$6.45
2	7" × 32"	200	5726K21	5726K22	5726K23	5726K24	5726K25	5726K26	10.88	8.70
3	4.1" × 8"	25	5726K31	5726K32	5726K33	5726K34	5726K35	5726K36	3.71	3.09
4	4.1" × 14"	50	5726K41	5726K42	5726K43	5726K44	5726K45	5726K46	4.88	4.06
8	5.5" × 21"	100	5726K51	5726K52	5726K53	5726K54	5726K55	5726K56	5.96	4.97
9	5.5" × 32"	160	5726K61	5726K62	5726K63	5726K64	5726K65	5726K66	7.36	6.23
Polypropylene Felt										
1	7" × 16.5"	100	5783K11	5783K13	5783K14	5783K15	5783K16	5783K17	7.41	5.93
2	7" × 32"	200	5783K21	5783K23	5783K24	5783K25	5783K26	5783K27	10.41	8.33
3	4.1" × 8"	25	5783K31	5783K33	5783K34	5783K35	5783K36	5783K37	3.75	3.13
4	4.1" × 14"	50	5783K41	5783K43	5783K44	5783K45	5783K46	5783K47	5.46	4.47
8	5.5" × 21"	100	5783K51	5783K53	5783K54	5783K55	5783K56	5783K57	6.54	5.35
9	5.5" × 32"	160	5783K61	5783K63	5783K64	5783K65	5783K66	5783K67	7.69	6.41

Carbon Service Company

AQUA 2500 HP

TYPICAL FLOWS	20-80 gpm
MAXIMUM SUGGESTED FLOW#	125 gpm
MAXIMUM PRESSURE	150 psig
MAXIMUM TEMPERATURE	150°F



STANDARD FEATURES

- 2,500 lbs. virgin carbon, domestic coal base, 8 x 30 mesh, 900 min. I_2#.
- 3" FNPT inlet and outlet connections.
- Heavy duty, corrosion resistant *Polyglass*™ composite poly vessel, w/ vacuum breaker.
- An advanced internal distribution and collection system designed to maximize flow and carbon utilization.
- High Pressure vessel rated to 150 psig operation @ 150° F.

OPTIONAL FEATURES

- Top quality reactivated coal base carbon 8 x 30 mesh, 850 min. I_2#. (-$ 750.00)
- 3" Aluminum Cam-Lok™ fittings. (+$ 65.00)
- Pressure gauge assembly. (+$ 37.50)
- Sample port assembly. (+$ 35.00)
- Flexible hose assemblies. See page (SE-3)
  3" x 10' (+$ 125.00 to $ 275.00)
  3" x 20' (+$ 195.00 to $ 445.00)
- Solids prefilter systems. See pages (SE-4 to 7)

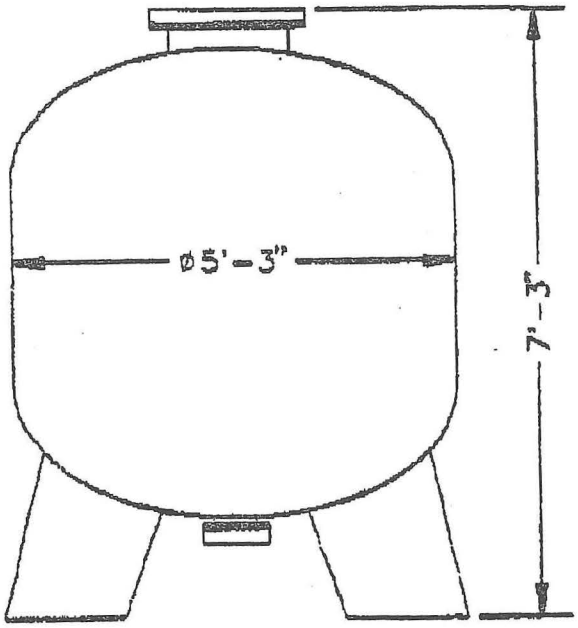
(#) Based on (2) two units operating in-series and may not be effective in all applications.

P.O. Box 838 • Donora, Pennsylvania 15033 • Phone 412-379-8032 • Fax 412-379-7780

* C601A
C602A

Carbon Service Company

AQUA 2000 HP



TYPICAL FLOWS	20-65 gpm
MAXIMUM SUGGESTED FLOW#	100 gpm
MAXIMUM PRESSURE	150 psig
MAXIMUM TEMPERATURE	150°F

STANDARD FEATURES

- 2,000 lbs. of Atochem™ virgin carbon, coal base, 8 x 30 mesh, 900 min. I$_2$#.
- 2" FNPT inlet and outlet connections.
- Heavy duty, corrosion resistant *Polyglass*® composite poly vessel.
- An advanced internal distribution and collection system designed to maximize flow and carbon utilization.
- High Pressure vessel rated to 150 psig operation @ 150° F.

OPTIONAL FEATURES

- Top quality reactivated coal base carbon 8 x 30 mesh, 850 min. I$_2$#.
- 2" Cam-Lok™ fittings w/ caps. (+$ 45.00)
- Pressure gauge assembly. (+$ 37.50)
- Sample port assembly. (+$ 25.00)
- Flexible hose assemblies. See page (SE-3)
  2" x 12' (+$ 80.00 to $ 270.00)
  2" x 20' (+$ 105.00 to $ 315.00)
- Solids prefilter systems. See pages SE-4 to 7)

(#) Based on (2) two units operating in-series and may not be effective in all applications.

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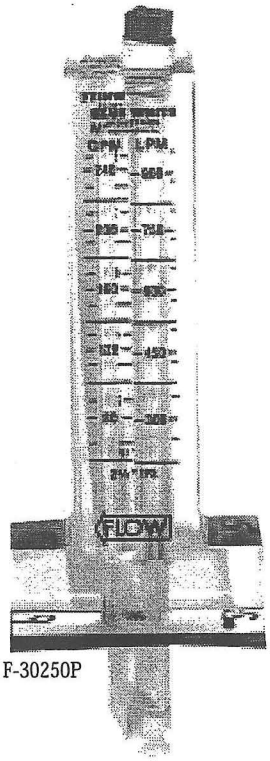
* C602B

Blue-White variable area flow meters are manufactured in over 240 configurations, with styles for in-line, panel mount or closed pipe installations. A wide range of calibrations are offered. Blue-White flow meters are constructed of either machined, highly-polished acrylic or heat and chemical resistant injection molded polysulfone. Internal parts are corrosion and wear resistant. Scales are screen printed onto the meter directly in front of the float for accurate meter reading. Optional design features include: protective shields, flow adjustment valves and high/low flow alarms.

F-300 Series Flow Meters

Features:

- Tough, one-piece machined acrylic meter body.
- Corrosion resistant 316 SS float.
- Permanent screen printed scale.
- Calibrated pitot tube.
- Designed to mount on horizontal pipe (other options available).



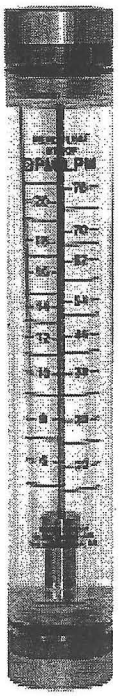
F-30250P

F-400LN Series

In-Line Flow Meters

Features:

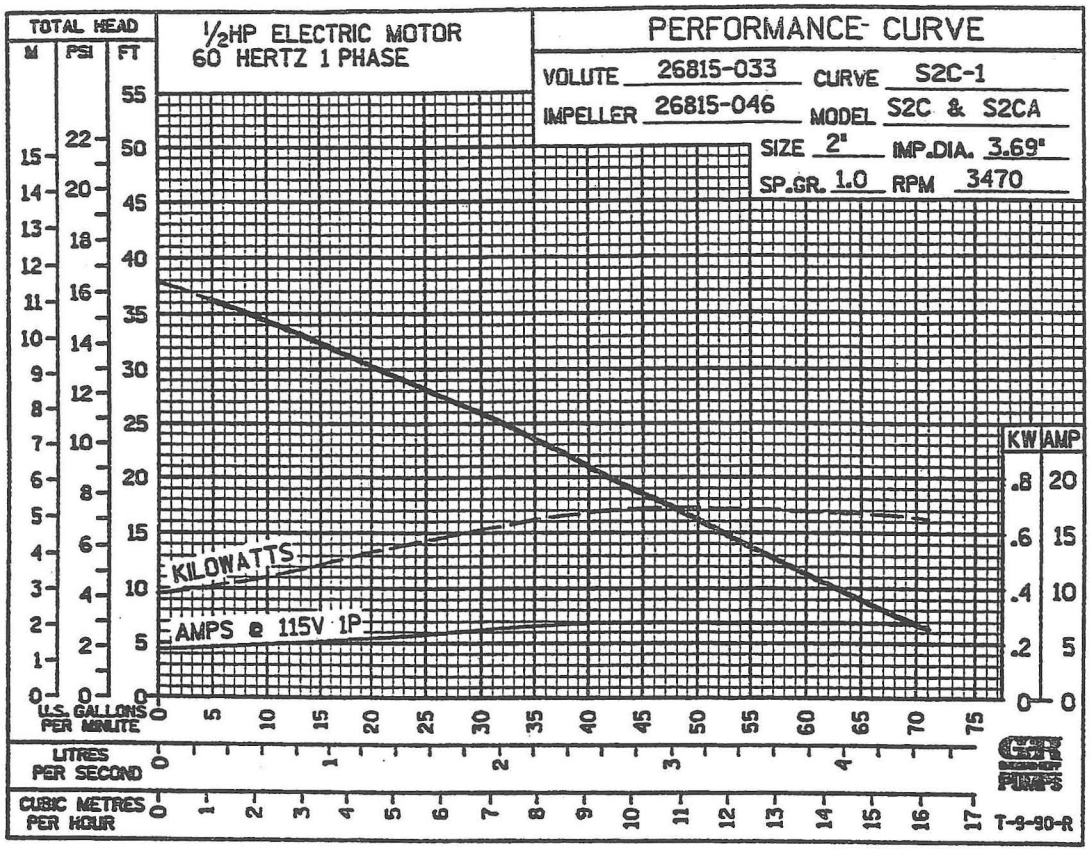
- Clear-as-glass machined acrylic construction.
- Corrosion resistant 316 SS float, except model F-40375LN-6 which is PVC.
- Reinforced FPT adapters.
- Viton O-ring seals.
- Optional high/low flow alarm available on units with flow rates of 0.5 to 5.0 gpm and 2.0 to 20 gpm, with adapter connections in ¾" and 1" FPT.



F-41000LN-12

Pipe Size (In.)	Part Number	Scale Range GPM	Scale Range LPM	Price Ea. ($)
F-300 Series Flow Meters				
1	F-30100P	5-40	20-150	57.67
1	F-30100PR	2-10	-	57.67
1¼	F-30125P	15-75	55-275	57.67
1¼	F-30125PR	5-35	30-130	57.67
1½	F-30150P	20-100	75-375	57.67
1½	F-30150PR	8-30	30-110	57.67
2	F-30200P	40-150	150-550	61.98
2	F-30200PR	15-70	60-260	61.98
2½	F-30250P	60-240	250-900	70.73
3	F-30300P	80-300	300-1125	79.73
3	F-30300PR	40-140	160-520	79.73
4	F-30400P	125-500	500-2000	86.97
6	F-30600P	250-1050	900-3900	140.63
8	F-30800P	500-1900	1800-7200	156.31

Pipe Size (In.)	Part Number	Scale Range GPM	Scale Range LPM	Price Ea. ($)
F-400LN Series Flow Meters				
¼	F-40250LN-4	.025-.250	.1-1	74.44
⅜	F-40250LN-6	.025-.250	.1-1	74.44
⅜	F-40375LN-6	.1-1	.4-4	63.66
⅜	F-40376LN-6	.2-2	1-7.5	63.66
⅜	F-40377LN-6	.3-3	1.5-11.5	68.82
⅜	F-40500LN-6	.5-5	2-20	63.66
½	F-40375LN-8	.1-1	.4-4	63.66
½	F-40376LN-8	.2-2	1-7.5	63.66
½	F-40377LN-8	.3-3	1.5-11.5	68.82
½	F-40500LN-8	.5-5	2-20	63.66
¾	F-40750LN-12	1-10	4-38	122.64
¾	F-41017LN-12	1-17	4-64	122.64
¾	F-41000LN-12	2-20	8-80	122.64
1	F-40750LN-16	1-10	4-38	122.64
1	F-41017LN-16	1-17	4-64	122.64
1	F-41000LN-16	2-20	8-80	122.64
with High/Low Level Alarm				
Float Material PVC				
¾	FA-41500LN-12	0.5-5.0	2-20	261.89
1	FA-41500LN-16	0.5-5.0	2-20	261.89
Float Material 316 SS				
¾	FA-41000LN-12	2.0-20	8-80	269.19
1	FA-41000LN-16	2.0-20	8-80	269.19



Performance Curve – Model S2C3A 115V 1P

Lift Pump into Seats from Hold Tank

*All Submersible Pumps